April
1930

Electrical Manufacturing

Vol. 5 A Gage Publication No. 4

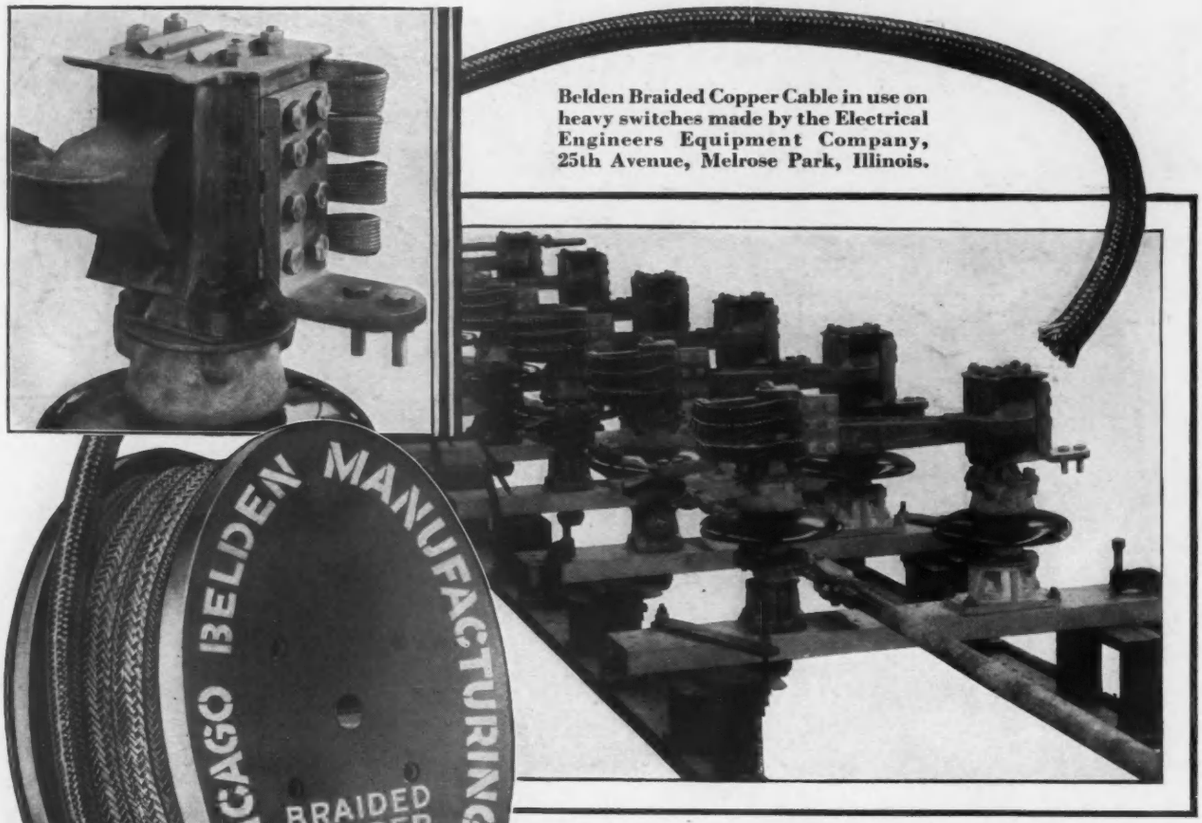
The Standard of Quality
In Chromium Plating . . . . . .

Standards of quality in chromium plating are set by plants installed and operated with the assistance of this organization.

Hand in hand with work of the highest quality, go economy and large production.

The ability to meet every problem involved in this modern-day plating is assured by a long record of successful installations.

WEISBERG & GREENWALD
ENGINEERS ~ CHEMISTS
71 WEST 45th St. New York



Belden Braided Copper Cable in use on heavy switches made by the Electrical Engineers Equipment Company, 25th Avenue, Melrose Park, Illinois.

In addition to the braided cable shown above Belden makes stranded cables in a great variety of sizes and insulations.

Electrical Engineers Equipment Co Uses Belden Braided Copper Cable

FROM the finest braided and stranded lead wire used on small electrical equipment to the heaviest braided copper cable used in switching of heavy currents at high voltage, Belden offers a complete Braided and Stranded Copper Cable service to electrical manufacturers.

Belden Stranded and Braided Cables are extremely flexible and pliable. In addition to their consistent use by leading manufacturers of high tension switches, they are used for brush pigtails, automobile ground straps, and a great variety of services where a flexible conductor of great durability is required.

Available in a great variety of shapes and sizes—both bare and insulated. Why not write for figures on your requirements?

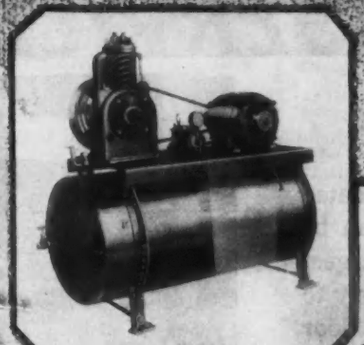
BELDEN MANUFACTURING CO. 4633W. Van Buren St., Chicago, U. S. A.

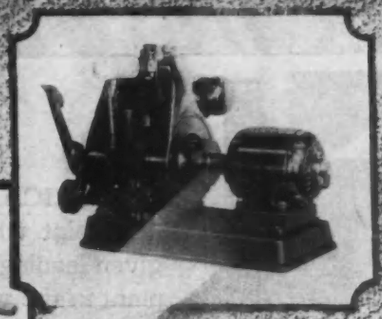
Belden

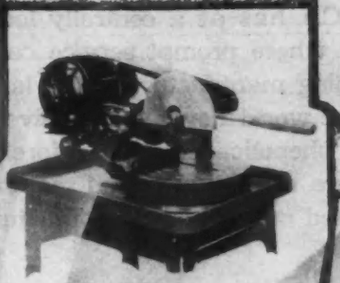
Belden Products

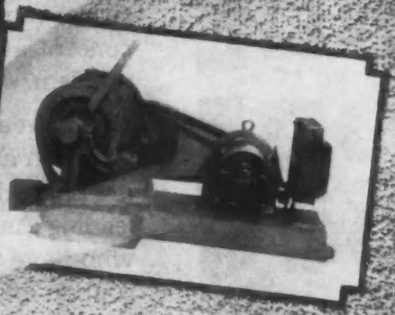
Beldenamel and Textile Magnet Wire • Bakelite Moldings • Coil Windings • Automotive Wires and Cables • Airplane Assemblies • Radio Wires, Cords and Cables • Rubber Covered Wires • Armored Cables • Flexible Armature Wires • Motor Lead Wires • Braided and Stranded Copper Cables • Cotton Sleeving

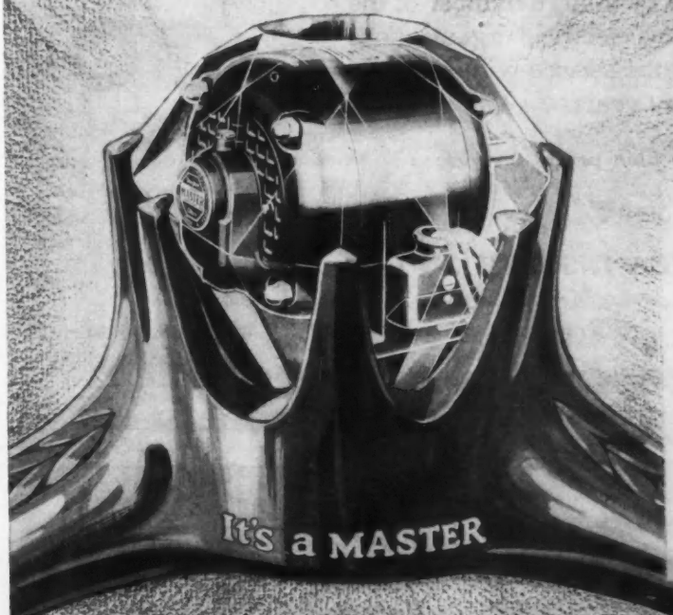
SETTINGS of the POWER DIAMOND











It's a MASTER

The complete record of "Power Diamond Settings" is a most impressive story of the recognition of Master Motor quality by American Industry. In the industrial centers of the World, manufacturers of *many types* of machines, have staked their reputation on these motors.

Built to stand up under any of the varied operating conditions to which they may be subjected—designed to meet the particular functions of the machines they drive—Master Guaranteed Motors are delivering uniform and complete satisfaction.

THE MASTER ELECTRIC COMPANY
DAYTON, OHIO

STOCKS CARRIED IN PRINCIPAL CITIES

MORE THAN 100 SERVICE STATIONS

MASTER GUARANTEED MOTORS

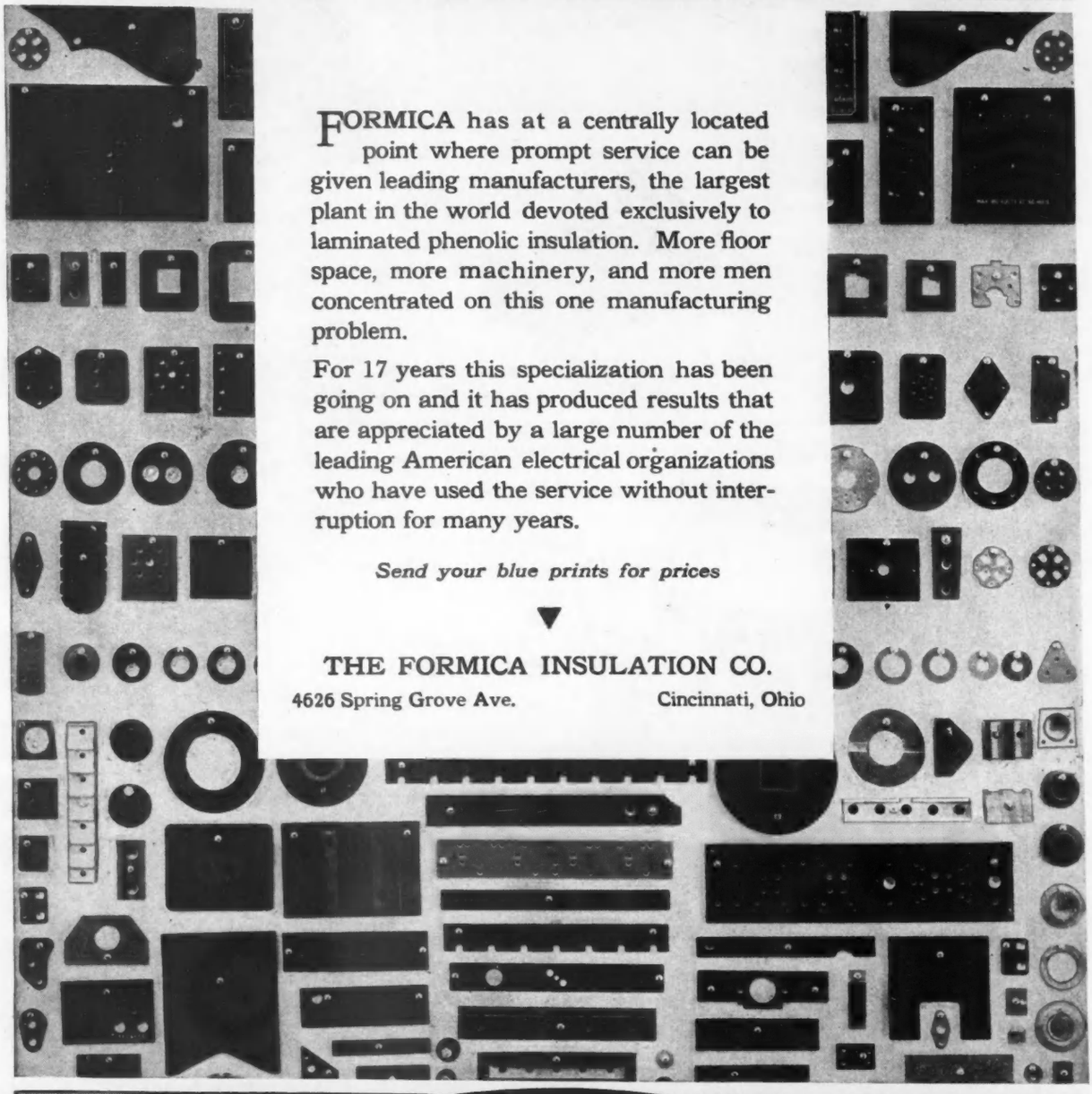
1/20 TO 10 H.P.

Dayton THE MASTER ELECTRIC CO. Ohio

Not More Than 40°

BIG RESOURCES

FOR INSULATING SERVICE



FORMICA has at a centrally located point where prompt service can be given leading manufacturers, the largest plant in the world devoted exclusively to laminated phenolic insulation. More floor space, more machinery, and more men concentrated on this one manufacturing problem.

For 17 years this specialization has been going on and it has produced results that are appreciated by a large number of the leading American electrical organizations who have used the service without interruption for many years.

Send your blue prints for prices

▼

THE FORMICA INSULATION CO.

4626 Spring Grove Ave. Cincinnati, Ohio

FORMICA

Electrical Manufacturing

Reg. U. S. Patent Office

Volume 5 APRIL, 1930 Number 4

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ELECTRICAL MANUFACTURING'S editorial program has the following objectives:

Production

To help all electrical manufacturers, including makers of motor-driven products, increase the product's salability, cut unit production costs, quicken turnover, reduce overhead expenses, establish standard methods of work, and spread a better knowledge of raw materials and parts.

Marketing

To spread a better knowledge of and aid electrical manufacturers in adjusting sales management to the buyers' market, to aid in making advertising more effective, finding the most profitable distribution channels, and promoting cooperative market development.

Administration

To further the working out of sounder management policies and better executive control, coordinating sales and production schedules, promoting research, and developing better industry relations.

Repairing

To help all motor repair shops to build better business by developing a sounder organization, improving management, policies and methods, and developing a keener merchandising point-of-view on the business.

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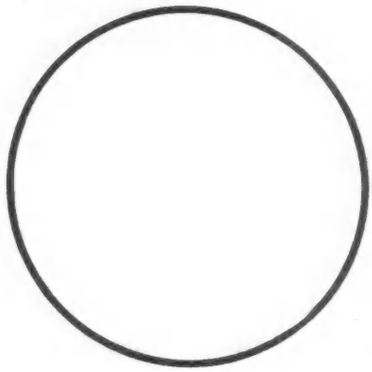
a NEW NAME . . .



ON APRIL FIRST The Scranton Button Company becomes the AMERICAN RECORD CORPORATION—a change in a name that is as old as the electrical industry.

In no way will that change affect the policies that have, for so many years, guided us in providing a high standard of quality, uniformity and accuracy in moulded products.

The original name was descriptive of the manufacturing activities of the company when it was founded—specializing in the moulding of millions of buttons for the vast needs of the garment industry.

Priceless experience was thus gained in the making of finer moulds and that experience was asked to serve many other industries.

As the electrical industry advanced and saw the need of better insulation and closer limits in accuracy, Scranton Button experience was again called upon.

Radio, too, depended on us in effecting higher standards of quality in fine moulding. Today radio manufacturers are calling on us for MILLIONS of moulded parts in a myriad of kinds and shapes.

Incidentally, the new name bespeaks the principal manufacturing activity of this company—moulding of phonograph records. The moulding of many things in Bakelite, Lacanite, Durite and Durez is carried on in special departments.

Bear the new name in mind, change your records but don't lose sight of the fact that the old Scranton Button reliability can be depended on as always.

American Re

Principal Offices and Plant

NEW YORK
50 Union Square

DETROIT
145 East Lawn Ave.

. . .for America's foremost moulders

cord Corporation

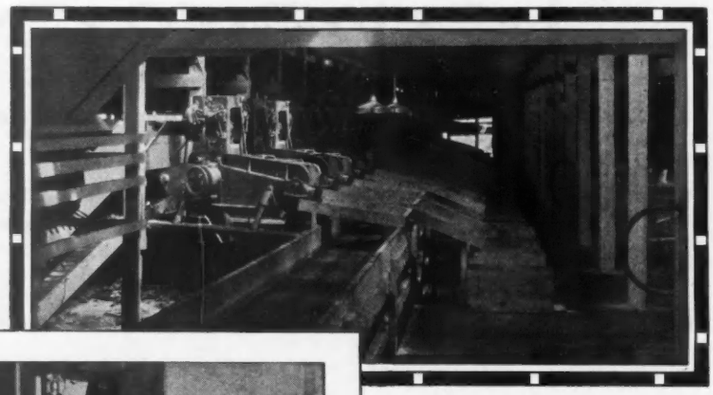
at Scranton, Pennsylvania

CLEVELAND
4900 Euclid Bldg.

CHICAGO
645 Washington Blvd.

A SERVICE

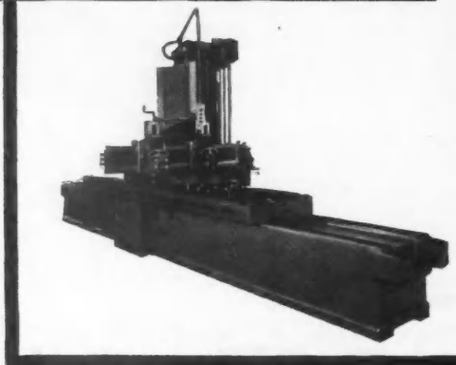
Motor specialists constantly available to help solve your motor problems.



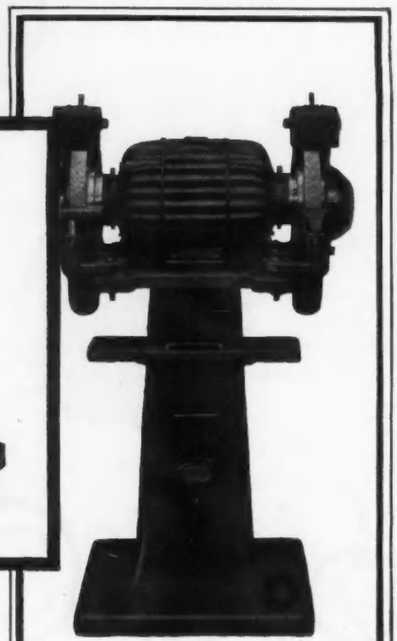
Tuc Huskers in a canning plant. The Westinghouse motors on these machines are protected from overloads by Westinghouse Deion Linestarters.

Landis 12" pipe threading and cut-off machine powered by Westinghouse.

• • •



Cleveland open-side planer equipped with Westinghouse reversing planer equipment. This equipment permits increased production because of faster acceleration and deceleration of platen.



A complete line of Blount grinders are equipped with Westinghouse motors and control. Westinghouse engineers are always ready to cooperate with manufacturers in the application of Westinghouse motor drives to their machines.

For you and your customers

Have you ever considered what a motor specialist's advice is worth to you, a manufacturer of motor-driven machinery? For example, when it is necessary to make an unusual motor application to meet some unusual operating condition.

It is then that a manufacturer, who has adopted Westinghouse motors as his standard drive, calls on Westinghouse motor specialists. They are always available to help him iron out especially knotty problems.

His customers appreciate this expert service because they know Westinghouse men and have confidence in their ability.

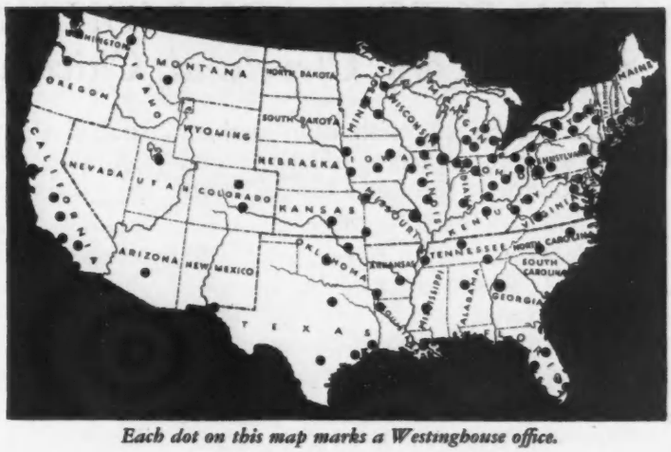
This service is available to manufacturers using Westinghouse motor drives no matter where they ship their machines, because the extent of the Westinghouse organization makes it a local company everywhere.

• • •

More than forty years' experience in the design and construction of motors for application to all types of motor-driven machines gives Westinghouse the skill and ability to establish and maintain balanced design and construction.

Are you getting this 7-fold service with the motors you use?

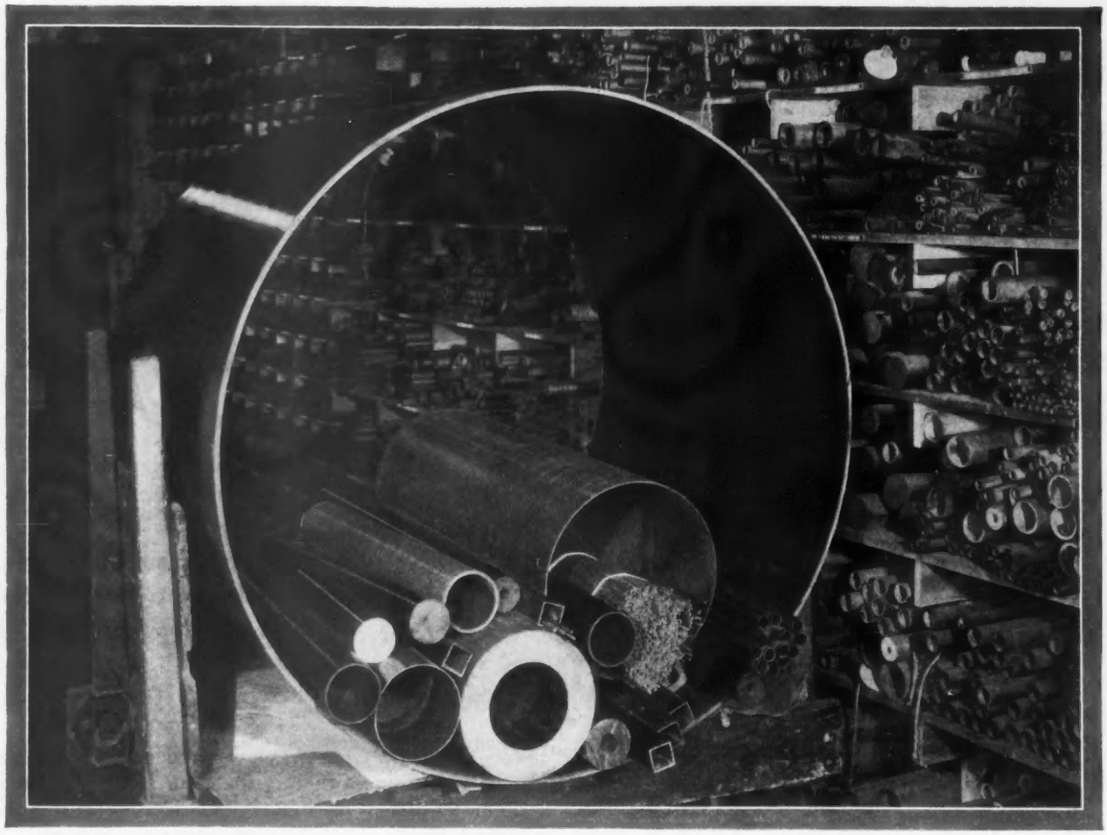
1. Prestige of the electrical equipment to help reduce sales resistance.
2. Twenty-two thousand different styles, sizes and ratings of motors to select from, with control to match.
3. Service facilities in thirty-three strategically located centers to service the equipment you sell.
4. Motor specialists constantly available to help solve your motor application problems.
5. Engineering service available for co-operation in the design of your product for future or present needs.
6. Contacts in the field that give alert manufacturers new leads to business.
7. Advertising that helps broaden the field for electrically driven machinery.



Each dot on this map marks a Westinghouse office.

Service, prompt and efficient, by a coast-to-coast chain of well-equipped shops

Westinghouse



Stocks like this—

of DILECTO and DIAMOND FIBRE are carried in New York, Cleveland, Chicago and Toronto

ALL our careful methods of analysis and manufacture would be wasted if we had not provided for adequate facilities of distribution.

Aside from the principal plants in Newark, Delaware, and Bridgeport, Pennsylvania, we have large warehouse stocks and fabricating plants in New York, Cleveland, Chicago and Toronto.

This assures the electrical manufacturer of prompt service and delivery of our insulating materials either in sheets, rods, tubes or in special shapes fabricated to specification.

DILECTO—is a water and moisture resisting laminated phenolic insulating material made in standard sheets, rods and tubes. It can be fabricated to meet your requirements.

DIAMOND FIBRE—is a hard vulcanized fibre made in standard sheets, rods and tubes and special shapes. It can be fabricated, bent or formed to meet your requirements.

Your engineering department will like one of our DECIMAL EQUIVALENT CHARTS

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INDIANAPOLIS, IND.
MINNEAPOLIS, MINN.

In Canada
DIAMOND STATE FIBRE CO. OF CANADA, LTD.
350 Eastern Avenue, Toronto

IRVINGTON

It takes a "Mike" to find the seam in "IRV–O–FLATSEME"

Where is the seam? When you do find it, you will discover that it is only .005 to .007 in. thicker than the body of the tape while ordinary seams are .015 to .025 in. thicker.

"IRV-O-FLATSEME" is the newest development in sewed bias cambric tape. It accomplishes the following results:

Thinnest possible joint in sewed bias . . . Surface roughness reduced to minimum . . . Double stitched—well insulated—sewed splices which will not separate under tension . . . More uniform thickness throughout tape length . . . Can be used on taping machines without jerking . . . Smoother wrappings with minimum of air pockets . . . Joints that will readily conform to irregular surfaces.

Write for samples and prices. It costs no more than ordinary sewed bias . . Look for the Red Lined core—the hallmark of quality.

Specify the Red Lined core—the distinguishing mark of IRVINGTON INSULATION and a guarantee of long life.

Irvington Varnish & Insulator Co.
Irvington, N. J.
Established 1905

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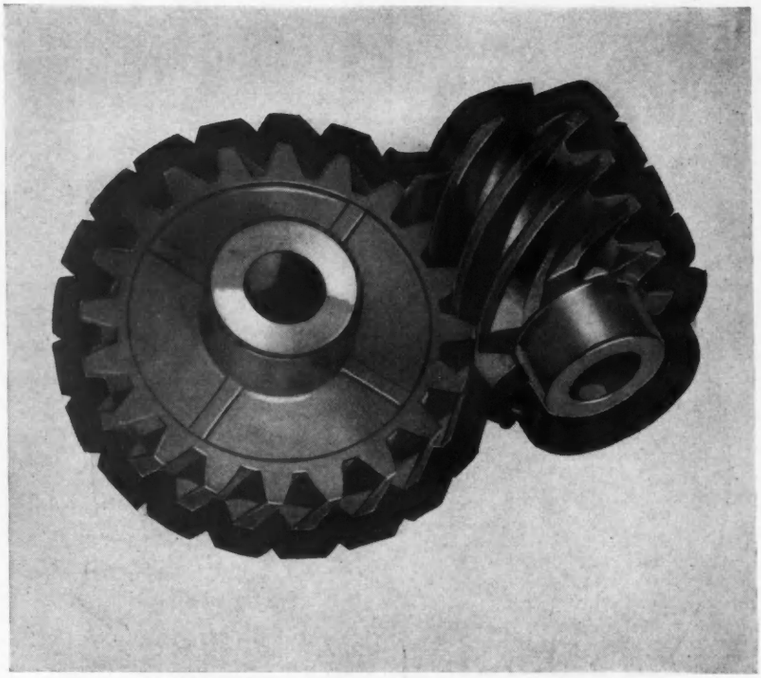
Consumer Rubber Co., Cleveland
Clapp & LaMoree, Los Angeles
A. L. Gillies, Toronto

INSULATION



WORM AND GEAR DIE CAST AT 1/5 OF FORMER COST

Die Casting Engineers Can Best Solve a Die Casting Problem

TO determine whether or not a part can be produced economically and satisfactorily by Die Casting requires an intimate knowledge of the possibilities and limitations of the die casting process.

Milwaukee Engineers have that knowledge . . . plus the advantages of 20 years of practical experience. Why not let them apply it to your problems of cost, production or design? You will not be obligated in any way. Write for particulars, or send blue-prints or samples for survey and quotation.

THIS die cast worm and gear represent one of the most unusual and most intricate problems in die design that Milwaukee Die Casting Engineers have ever been called upon to solve.

The worm has a sextuple (six-thread) lead of 1.9 inches and a linear pitch of .32 inch. The teeth are only one inch long which means that each tooth encircles the pitch diameter for only 180° or a half-turn . . . a very coarse pitch for a worm of small diameter.

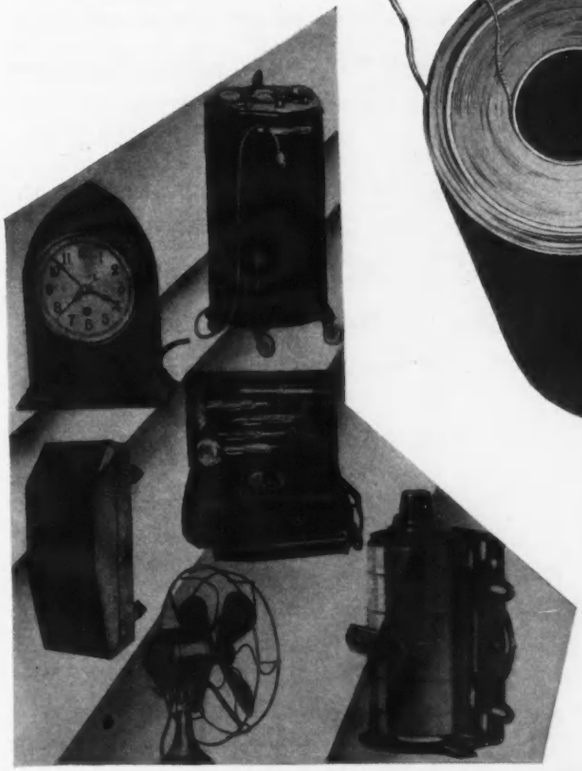
The worm-gear is also an intricate subject for die casting because of the sextuple lead, to say nothing of the difficulties of accurately die-casting the delicate curves of the gear-teeth.

Neither worm nor worm-gear require subsequent machining in the teeth, but are delivered ready-to-run. They constitute the driving mechanism for a slow speed, hand-powered adjustment device used on street cars. Die casting has reduced the cost of these parts to one-fifth (20%) of what it used to be.

MILWAUKEE DIE CASTING CO.
289 Fourth Street Milwaukee, Wis.

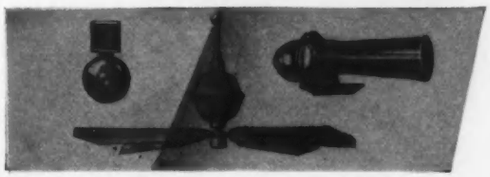
MILWAUKEE
DIE CASTINGS AND BEARINGS

The COIL'S *the* THING



UPON the coil depends the performance of the electrical product. ¶Uniformity of the electrical characteristics of a coil is therefore a matter of prime importance to every manufacturer of electrical appliances. ¶Careful workmanship, careful selection of uniform raw materials, and exacting tests make the electrical characteristics of the Dudlo Coil uniform and also make it dependable . . . a coil built to hold up under actual operating conditions.

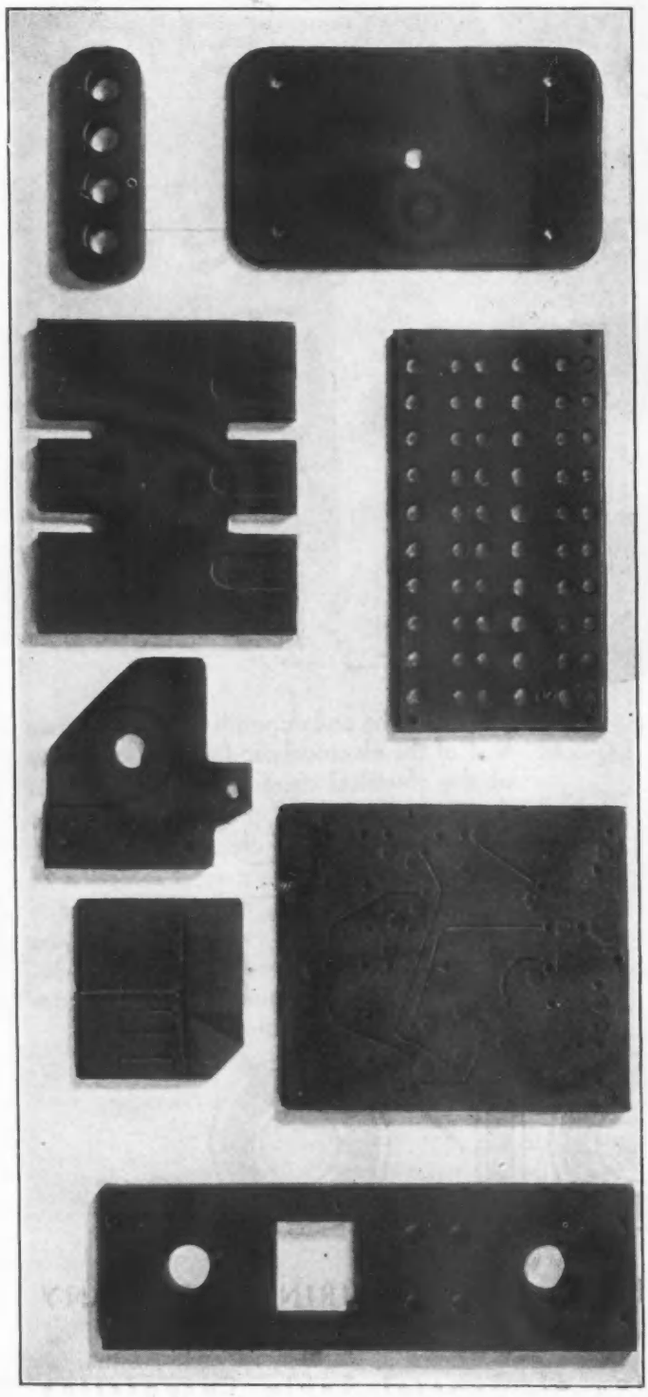
DUDLO



DUDLO MANUFACTURING COMPANY
FORT WAYNE, INDIANA
Division of General Cable Corporation

WHEN YOU NEED LARGE AMOUNTS OF SPECIAL SHAPED PANELS—USE

Ambler Moulded Ebonized Asbestos



This cold-moulded material has the same electrical and physical characteristics as Ambler Ebonized Asbestos in sheet form.

It is often used where special workings of large quantities render it more economical than the sheet material.

Moulds are made at our factory in Ambler. The largest size suitable is 20 x 25 inches. Ambler Moulded Ebonized Asbestos has high dielectric strength and exceedingly low moisture absorption.

Write for new catalog on "Ambler Asbestos Products for the Electrical Industry."

AMBLER

ASBESTOS SHINGLE & SHEATHING COMPANY

AMBLER, PENNA. ST. LOUIS, MO.

IS YOUR PACKAGING PROBLEM "DIFFERENT"?

THE points that make your business "different" are likely to be reflected in your packaging problem. Your packing system should therefore be specially designed to meet your particular requirements.

Only the trained package engineer can perform this service intelligently and efficiently.

The staff of 50 H & D Package Engineers has solved countless shipping problems for many diversified lines of business. Through their experience and skill shippers in innumerable lines have saved thousands of dollars.

SEND FOR THE PACKAGE ENGINEER

If you are interested in better and more economical shipping methods—send for an H & D Package Engineer. There's no charge or obligation.

THE HINDE & DAUCH PAPER CO.
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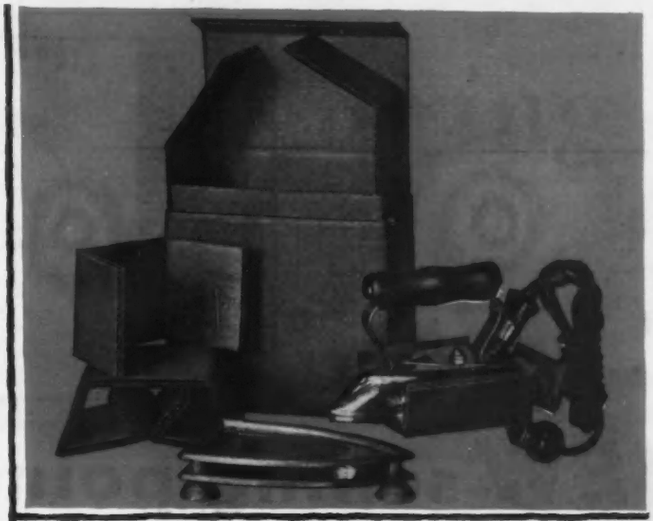
Western Address: Kansas City Fibre Box Co.
Packer's Station, Kansas City, Kansas
Canadian Address:
King's Street Subway and Hanna Ave., Toronto



A safe and compact H & D Engineered Package for an electric iron

Complete protection for a Sun Ray Lamp is provided by this H & D Engineered Package

Fragile radio tubes are safely shipped in H & D Engineered Packages

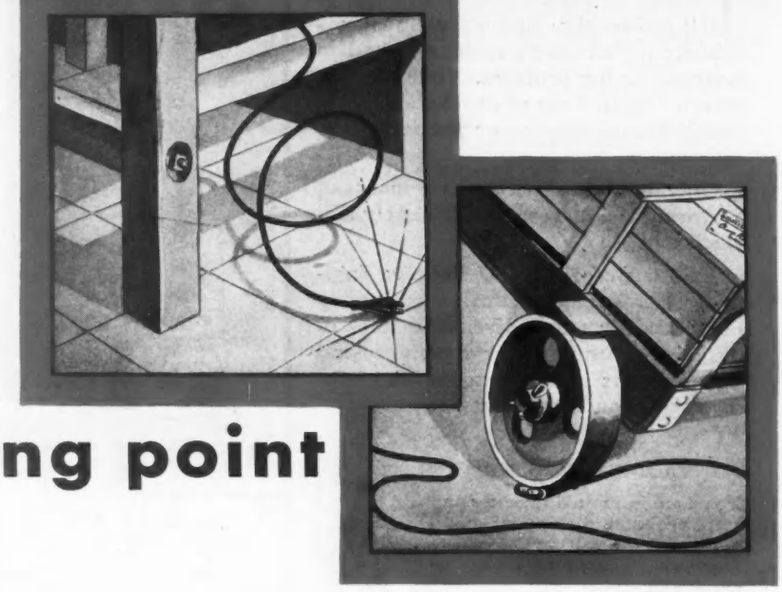
H&D

HINDE & DAUCH *corrugated fibre* SHIPPING BOXES

May we send you a copy of "How to Pack It"? It illustrates modern methods of packaging in your industry. Mail the coupon for a free copy.

THE HINDE & DAUCH PAPER COMPANY
325 Decatur Street, Sandusky, Ohio
Please send me a copy of "How to Pack It"

Name .....
Address .....
City ..... State .....
We are interested in packing .....



HERE'S a *NEW* selling point for you

Tough as gristle . . . resilient as a good tire — that's the G-E All-Rubber Plug for electric tools and appliances!

It can increase the dependability of *your* product . . . give you another selling point: "No time out for broken plugs." Nothing to come apart . . . *it's moulded on the cord.*

Hammer this new one-piece plug on a concrete floor . . . run over it with a truck . . . it springs back into shape with its moulded-in contacts ready for use.
And it withstands strains and yanks because the cord and wire are *moulded* together!

Write us today for data. Section D-324A, Merchandise Dept., General Electric Co., Bridgeport, Conn.

G-E ALL-RUBBER PLUG

Can be *moulded* on cords of every kind — rubber, cotton, asbestos and silk.

GENERAL ELECTRIC

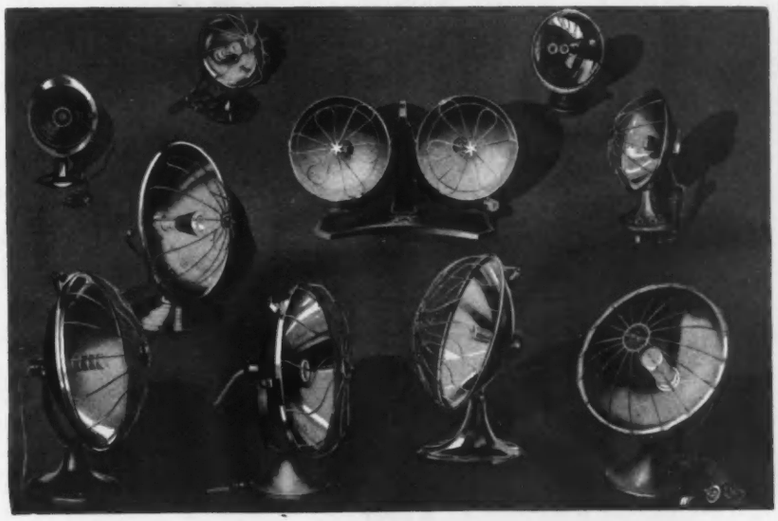
ALL-RUBBER PLUG

MERCHANDISE DEPARTMENT • GENERAL ELECTRIC COMPANY • BRIDGEPORT, CONN.

Sign of Spring

Fall is usually considered electric heater time. But when furnaces are dropped out in springtime—remember there are 16,536,000 wired homes that lack the cheer that 3,185,000 homes have with their electric heaters at work to kill the chill.

THERE are over a dozen reputable makers of electric heaters—using "Nichrome" IV—the essential point in heating element performance.

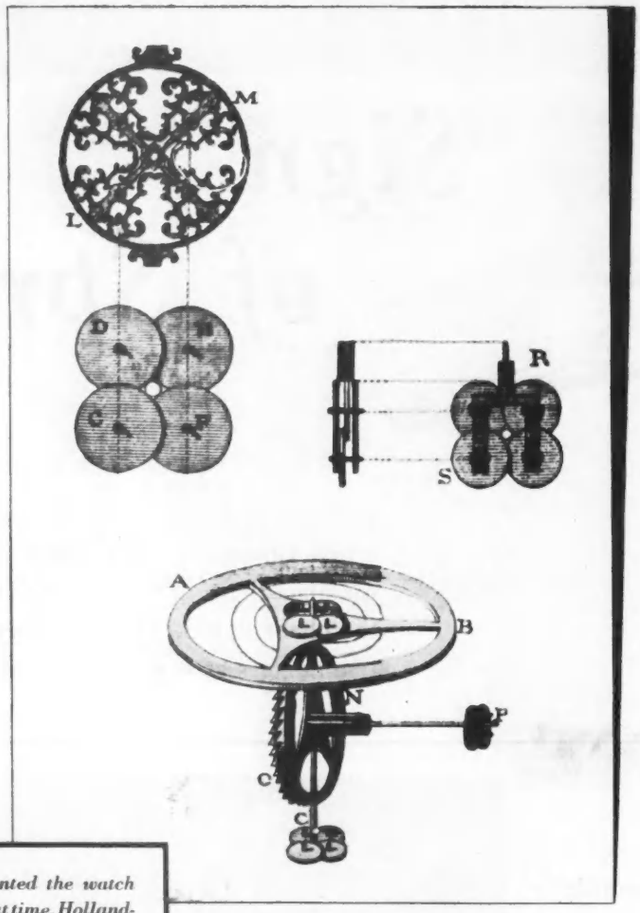


DRIVER-HARRIS COMPANY
HARRISON, NEW JERSEY
Chicago Detroit Morristown, N. J. Cleveland
England France Italy
In Canada—The B. Greening Wire Co., Ltd., Hamilton, Ont.

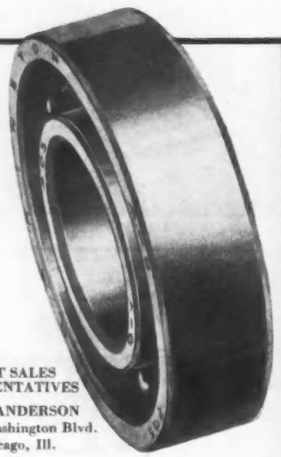
Sign of Quality—

Nichrome IV
High Temperature Service

THE WORLD FIGHTS FRICTION



In 1716, Henry Sully invented the watch escapement-disc. About that time, Hollanders conceived the idea of roller bearing tops for windmills. Slowly, but surely, progress was being made in the elimination of friction, which was to culminate with the invention of ball bearings.



THREE factors enter importantly into the performance of ball bearings . . . freedom from friction, resistance to wear, and load capacity.

Torrington Ball Bearings, judged by these accepted tests, are superior bearings.

They are made by an organization noted for decades of success in the manufacture of precision products.

Torrington Ball Bearings represent a combination of unusual technical skill and fine material, which coincides with the highest standards of design and construction.

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The TORRINGTON COMPANY
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2042 W. Grand Boulevard
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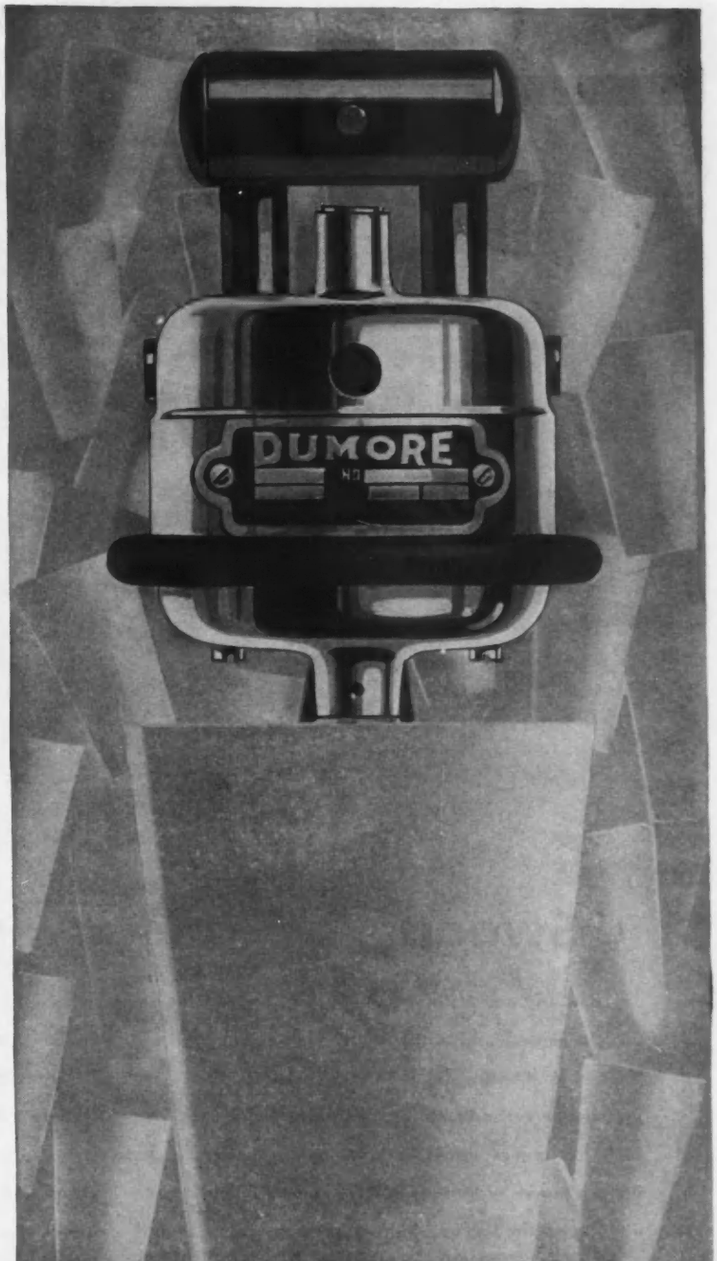
The Torrington Company
ESTABLISHED 1866
Torrington, Conn., U.S.A.

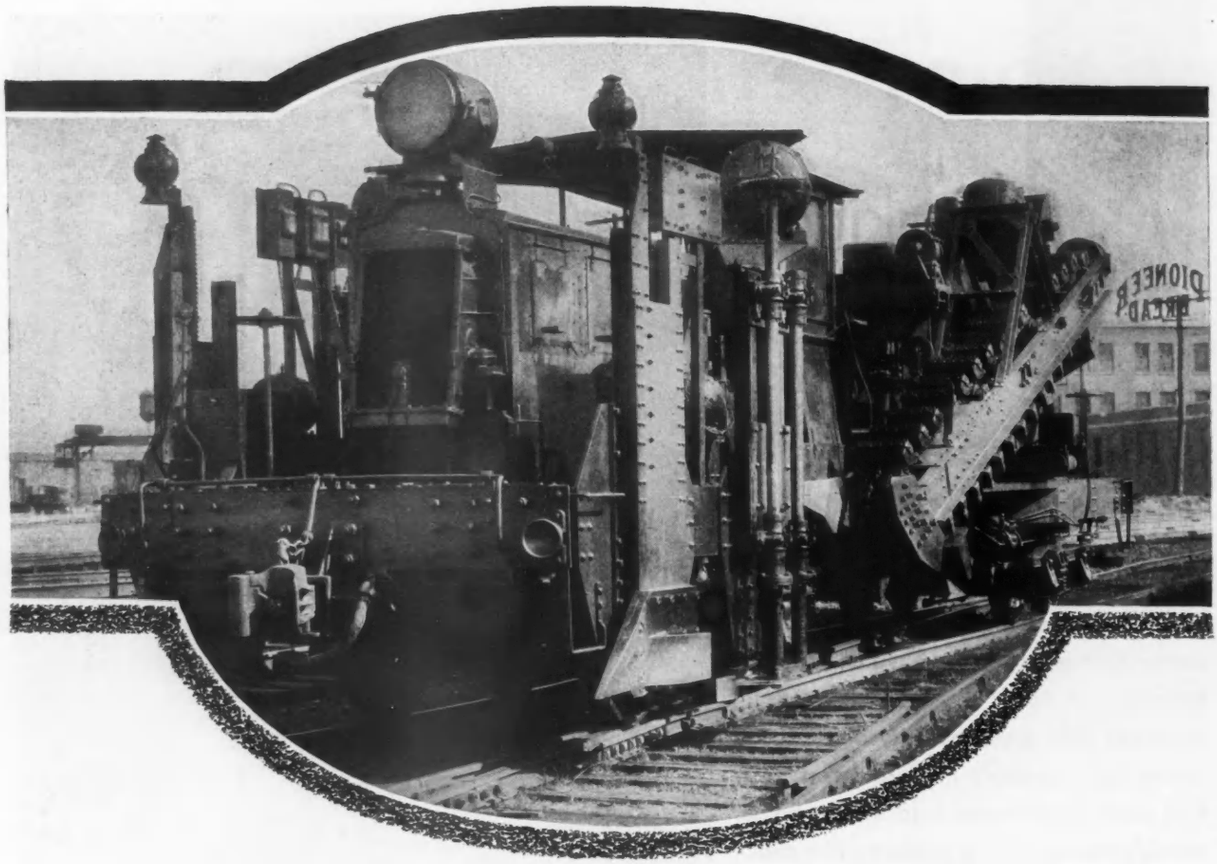
Making Electric Servants Better



TO the efficiency of drink mixers—and of countless other labor-saving electrical devices—Dumore Fractional Horsepower Universal Motors have contributed an essential part. Their speed, strength, economy and dependability of performance, make possible the preferred position such appliances hold in the home. Manufacturers whose performance problems are particularly exacting and who insist on absolute dependability have used Dumore Motors for many years . . . If you want reliable, trouble-free, vibrationless motor performance, based on scientific design and constructed with typical Dumore craftsmanship, it will pay you to investigate Dumore Motors.

THE DUMORE COMPANY
35 Sixteenth Street Racine, Wisconsin

DUMORE
FRACTIONAL HORSEPOWER
MOTORS



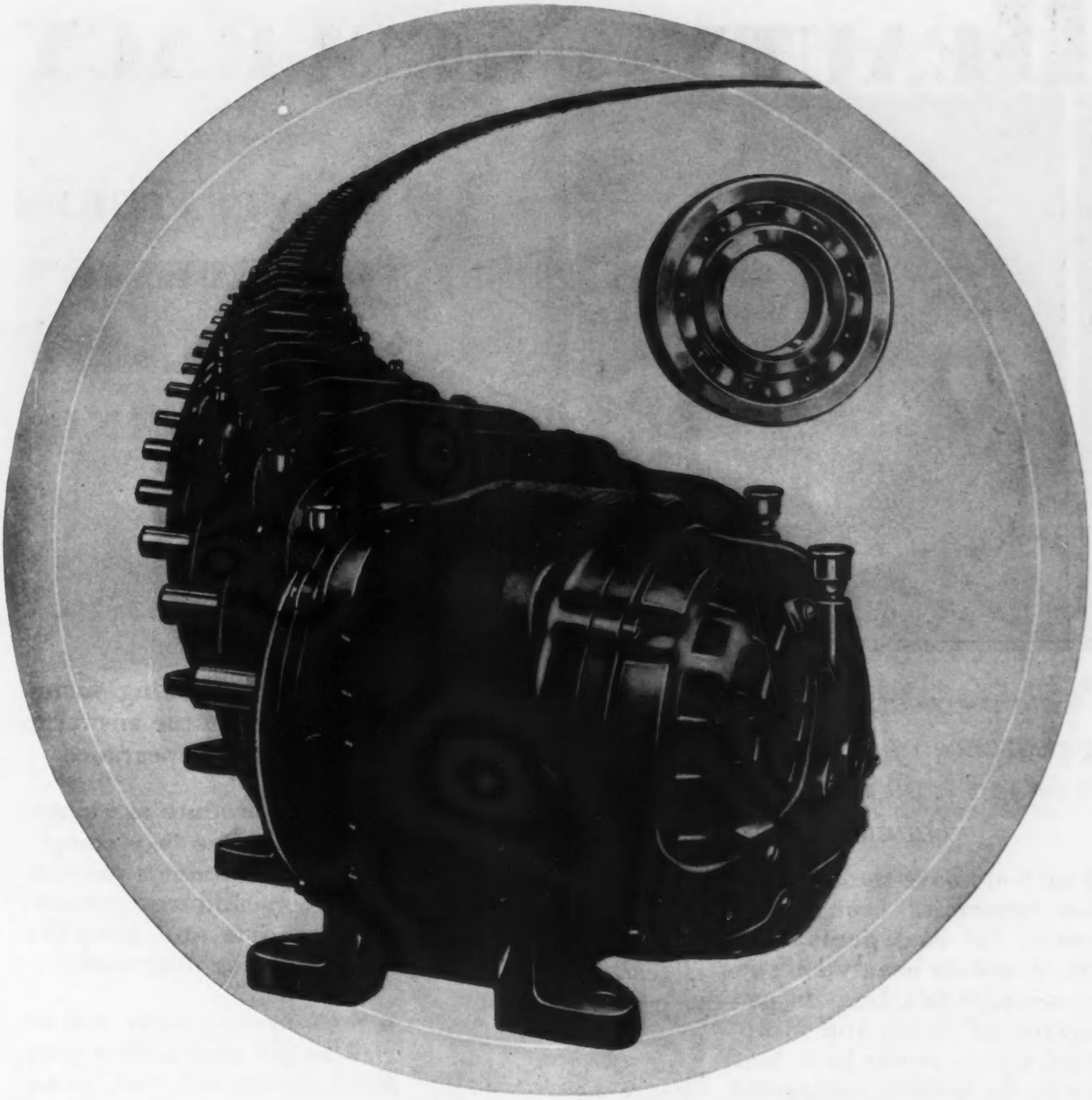
Swoop . . . and a new Roadbed!

A new and novel Robot, called the Ursino, has been designed and built by the American Railway Surfacing Machine Co., of New York City, for faster and better reconditioning of America's railway roadbeds. It moves slowly but continously onward under its own power — 50 tons of steel and ingeniousness — digging up the ballast, shaking and cleaning it before again depositing it behind. Train riding comfort is only possible when the ballast is clean, firm and evenly laid. The various devices necessary to accomplish these many difficult operations are actuated by seventeen electric motors built by the Electro Dynamic Company, of Bayonne, N. J. Not only are these motors weather-proof, but they are also wear-proof and trouble-proof, for all are equipped with New Departure Ball Bearings.

The New Departure Manufacturing Co., Bristol, Connecticut; Detroit, Chicago and San Francisco.

NEW DEPARTURE

BALL BEARINGS



"Chicago Pump" buys 15,000 Baldors

THE Chicago Pump Company bought their first Baldor Motors in 1920. For ten years, they have continued to buy Baldors in ever increasing number until now over 15,000 Chicago Pumps are Baldor equipped.

This is only one of many leading manufacturers of motor equipped products who concentrate on the Baldor Ball-bearing Motors.

Our books show that 90% of all firms who ever placed an order for Baldor Motors have continued to order them and in increasing numbers.

Specializing on ball-bearing designed motors for 10 years, Baldor has brought its line to a perfection that only long experience can produce. Ask for folder. Baldor Elec. Co. 4358B Duncan Av. St.Louis, Mo. U.S.A.

BALDOR

A BETTER BALL BEARING MOTOR

Eliminates Thrust and Lubrication Problems

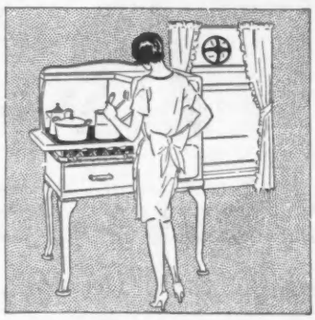
BEAUTY *and* ACCURACY

TWO FEATURES THAT IDENTIFY STEWART DIE CASTINGS

▼

Note the neat, smoothly finished appearance of this durable ventilator fan housing and perfectly balanced fan.

Over and above the recognized production economies brought about by the use of die cast parts, Stewart offers the utmost in beauty and accuracy of detail. Smooth perfection of finish and simplified design arethe basic factors in the modern conception of mechanical beauty. Consequently Stewart Die Castings —strong, light weight and accurate to the thousandth of an inch—please the discriminating manufacturer. He sees in them the answer to the insistent demand for Appearance.



Stewart Die Castings produce as a single unit what would otherwise be a complicated assembly. They eliminate machining and handling expenditures, measurably reduce unit costs and simplify manufacturing operations.

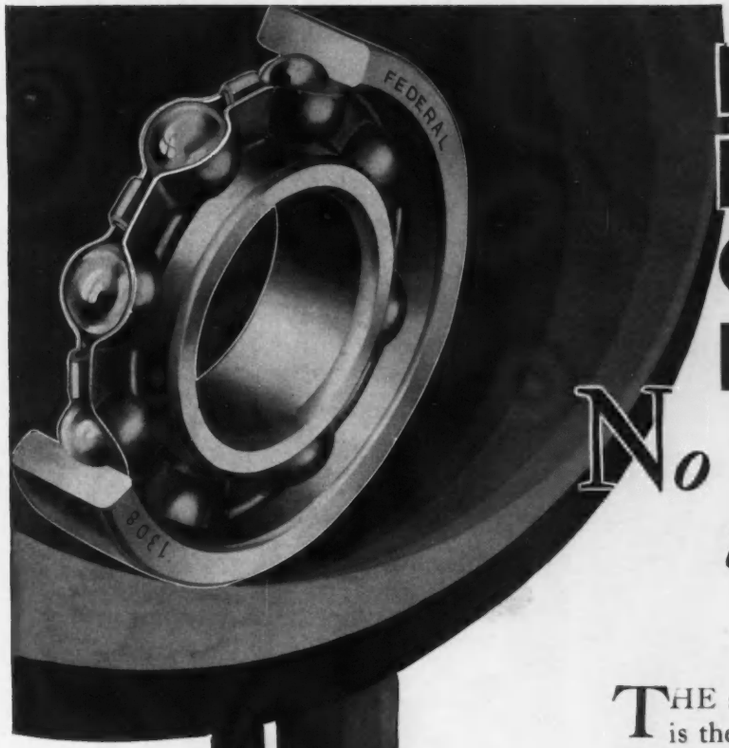
A Stewart engineer will be glad to call and discuss your requirements with you, or we will submit definite information upon receipt of blue prints or samples of your present production.

Stewart

THE STEWART DIE-CASTING CORPORATION

4500 Fullerton Avenue, Chicago, Illinois

Detroit ◆ Pittsburg ◆ Dayton ◆ St. Louis
Newark ◆ Cleveland



BETTER BEARINGS CANNOT BE HAD...

No matter what the price..

THE steel that goes into these bearings is the finest high carbon chrome steel. Each bearing is made with utmost care and precision. Every operation is checked. Every bearing part tested and calibrated. The most minute inspection follows every step in processing. The result is—a bearing of unusual quality giving better service and capable of sustaining the name and reputation of FEDERAL RADIAL BALL BEARINGS.

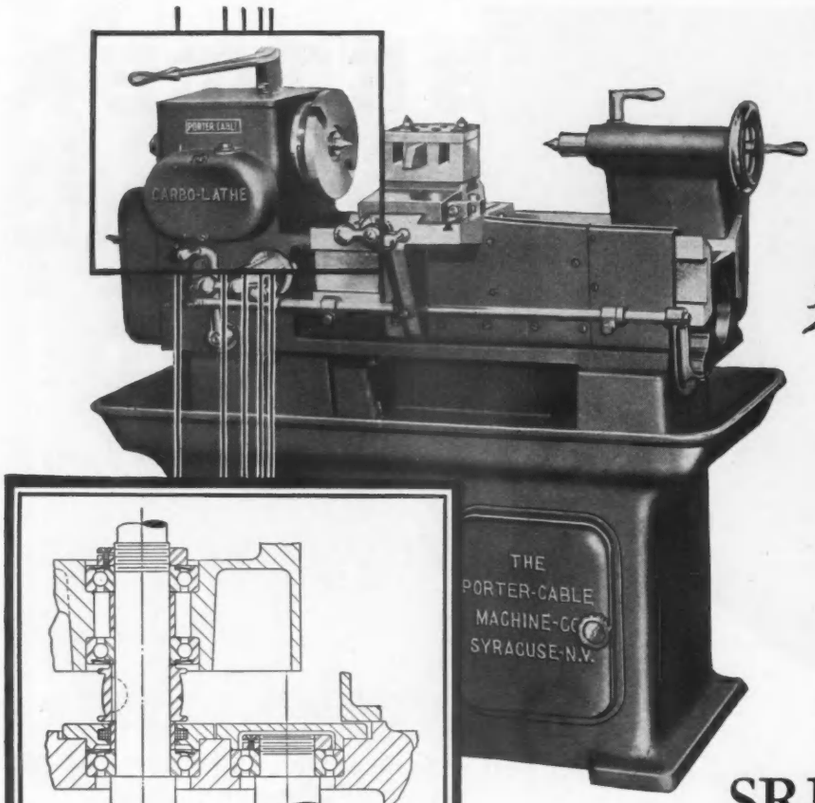
These are the reasons why we feel justified in making the statement that better bearings cannot be obtained, regardless of price!

The Mark of a Good Bearing

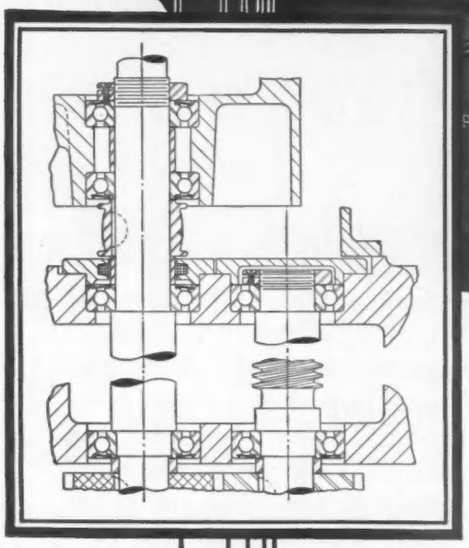
The Federal Bearings Company, Inc.
Poughkeepsie, N. Y.

Detroit Sales Office: 917 *Book Bldg.*

FEDERAL



Another SRB Installation!



SRB *Lubri-Seal* Ball Bearings Increase Efficiency *of* Porter-Cable Carbo-Lathes

THIS highly efficient machine tool is equipped with sixteen SRB Ball Bearings at vital points.

As in many other industrial applications, SRB Lubri-Seal Ball Bearings are used to exclude dirt and chips from the bearing housings. The lubricant is retained for indefinite periods, thus reducing maintenance costs and insuring years of uninterrupted and care-free service.

"Lubri-Seal" your own product for greater efficiency and improved bearing performance.

STANDARD STEEL AND BEARINGS INCORPORATED
Plainville DIVISION OF MARLIN-ROCKWELL CORPORATION *Connecticut*

Ball SRB Bearings

NOW!!

MORE THAN EVER BEFORE

INSIST ON ~

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—for greater ultimate manufacturing economies!

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146 Munson Street New Haven, Conn.

Tomorrow's Profits will come from Today's Efforts to make things better.

NDC-24

Weston
or Equivalent

FULL many a customer's specification has borne this clause and "blushed unseen" for its implications. If by equivalent is meant the patterns, appearance, size, semblance of the same materials, movements, pointers, scales, markings and *original* degrees of accuracy—then a Weston has many imitators, but no equivalent. This is only natural since Weston has pioneered the art and blazed the trails in all major developments.

Time—and not specification tests—shows up the differences. Comparative values may seem identical in the beginning, but the one essential point of demarkation—*dependable service*—which can scarcely be provided for in specification tests, becomes more and more apparent with increasing years of service.

How often do those instruments which have been selected on the basis of price alone go back for repairs and adjustments? What are their costs of upkeep? And how much trouble and expense have they occasioned as a result of customers' complaints, impaired prestige and lost business?

It pays to install Westons, not only because their eventual cost is less, but because in no other instruments will be found their *equivalent* in satisfactory service to the user or in the measure of protection they afford the manufacturer of electrical equipment.

WESTON ELECTRICAL INSTRUMENT CORPORATION
582 Frelinghuysen Avenue, Newark, N. J.

Weston
PIONEERS SINCE 1888
INSTRUMENTS

Pressed Metal Parts Improve Your Product ...and Cost Less

BY replacing castings, forgings, wood parts, etc., with parts of pressed metal, more and more manufacturers are improving their product, and lowering production costs as well.

The ductility of sheet metal permits the use of stampings of intricate shapes and sizes—enhancing the appearance of the product, which in turn promotes greater salability. Stampings also are lighter in weight, yet possess greater strength than castings—thus saving in material. And because stampings require practically no machining, this expensive operation is eliminated — another saving that helps lower production costs.

The ability of G. P. & F. engineers to design parts or entire products for pressed metal fabrication is the result of 50 years' experience. And the 19-acre G. P. & F. plant, with modern equipment and 1500 skilled workmen, turning out over 100,000 pieces daily to fill the needs of a large clientele, is evidence of G. P. & F. capacity and service—and attractive prices.

Let G. P. & F. engineers help improve your product and lower production costs, too. Send sample part or blue print of your product for recommendations and quotations. There is no obligation.

Electric Hammer with Perforated Steel Barrel

This 16 gauge perforated steel barrel is an example of G. P. & F. engineering ability. It is a formed, welded, perforated steel fabrication. The advantage of using a barrel of this kind is that one barrel is exactly like the other, is light in weight, takes a very high finish and makes the completed tool a very good looking job.

GEUDER, PAESCHKE & FREY CO.

Sales Representatives in Principal Cities in all Parts of the Country

1392 St. Paul Ave., Milwaukee, Wis.
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STAMPINGS

GEUDER, PAESCHKE & FREY CO.

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Please send your 1930 Booklet, "In Harmony with Modern Progress," to the address below. It is understood the writer is not obligated.

Name _____

Company Name _____

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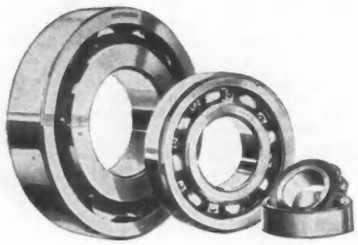
The three Crocker-Wheeler Motors shown—75, 50, and 5 H. P. respectively—use Norma-Hoffmann Precision Bearings —Crocker-Wheeler Electric Manufacturing Co., Ampere, New Jersey

Adding "PLUS" *to* "MOTOR VALUE"



Our engineers will be glad indeed to give you the aid of their specialized experience.

A MOTOR failure is costly to the motor owner—but its indirect effects may be far more costly to the motor builder. Motors, by their performance, must maintain the builder's reputation.

Motors seldom fail electrically; most "motor failures" are "motor bearing failures," really—just as most "motor troubles" are "motor bearing troubles."

That extra-dependability which PRECISION Quality imparts explains the ever-growing recognition accorded NORMA-HOFFMANN Precision Bearings by motor builders who seek to make their motors mechanically, as well as electrically, better.

NORMA-HOFFMANN
PRECISION BEARINGS

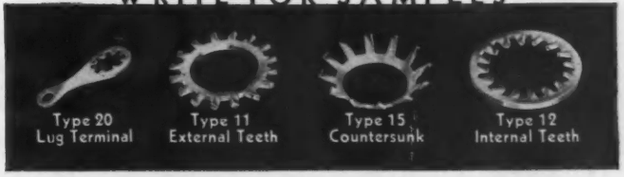
NORMA-HOFFMANN BEARINGS CORPORATION STAMFORD, CONN., U.S.A.

TANGLEPROOF
SPREADPROOF
MULTIPLE-LOCKING

DOWN the assembly line where minutes saved mean dollars earned—in modern production everywhere you will find SHAKEPROOF. Twisted teeth of steel hold the nut and the work in a grip that loosens only under applied pressure. If you are interested in better ways of doing things and methods that will save you money, it will pay you to send for free samples.

SPEED UP PRODUCTION with SHAKEPROOF

WRITE FOR SAMPLES



SHAKEPROOF
Lock Washer Company
[Division of Illinois Tool Works]
2513 North Keeler Avenue Chicago, Illinois

"SAY.... my *bookkeeper can add!*"

But he lost his job to an adding machine, anyway!

JABEZ FLINTROCK couldn't see that this new-fangled machine *was* an improvement. He refused to admit that extra expense sometimes really *pays*. And in the meantime, his longer-headed competitors used the innovation, widened operations, cut overhead costs, and forged ahead.

It happened with adding machines. It's happening today with FINISHES.

While many a business applies its good old finishes in the same old way, its competitors are experimenting with new and better finishes, which attract new buyers at no added cost, or which reduce costs and increase profits directly.

Egyptian Lacquer is cooperating daily with men who seek new and better materials—to cut costs and broaden markets. No matter what you make, if it requires a permanent finish, Egyptian Lacquer can help you. We either are all ready with a profit-making improvement for you, or we will put our vast research laboratories to work to develop an entirely new finish for *your* particular needs.

Call up the Egyptian Lacquer man in *your* city, today! Or send the coupon to New York.

THE EGYPTIAN LACQUER MFG. CO.
90 WEST STREET - NEW YORK CITY

Branches in charge of practical men *maintained in*

ATLANTA BOSTON BUFFALO CHICAGO CINCINNATI CLEVELAND DALLAS DETROIT KANSAS CITY LOS ANGELES PHILADELPHIA PORTLAND, ORE. SAN FRANCISCO SEATTLE SPOKANE ST. LOUIS

The Maker Who is PROUD of What He Makes, Uses Egyptian Lacquer

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It won't cost me anything to *find out* if you have anything I can use. Shoot!

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Characteristics against those of any other Electric Heating Element

—Working temperature range up to 2750° F.
—Capacity up to 150 watts per sq. inch of radiating surface.
—Resistivity in ohms per centimeter cube .0936 to 1.95.
—Coefficient of expansion one-half that of iron.
—Positive temperature characteristic within working temperature range.
—Watt capacities can be varied within wide range.
—Ease of installation or replacement.
—Low initial and maintenance cost.

IT doesn't matter whether your problem calls for a tiny resistor to carry minute currents—like those used in Radio Receivers or whether you require an enormous electric heating element to dissipate as high as 50,000 watts from a single element for forging steel—there is a Globar product best suited to your needs.

We maintain a competent staff of engineers whose duty it is to assist you. Their services are offered without obligation.

GLOBAR CORPORATION

(A SUBSIDIARY OF THE CARBORUNDUM COMPANY)

NIAGARA FALLS, N. Y.

Pacific Abrasive Supply Co., San Francisco and Los Angeles
Williams & Wilson, Ltd., Montreal—Toronto, Canada
Steinmetz & Company, Philadelphia

(Globar is the registered trade name given to non-metallic electrical heating and resistance materials, and to other products of Globar Corporation, and is its exclusive property.)

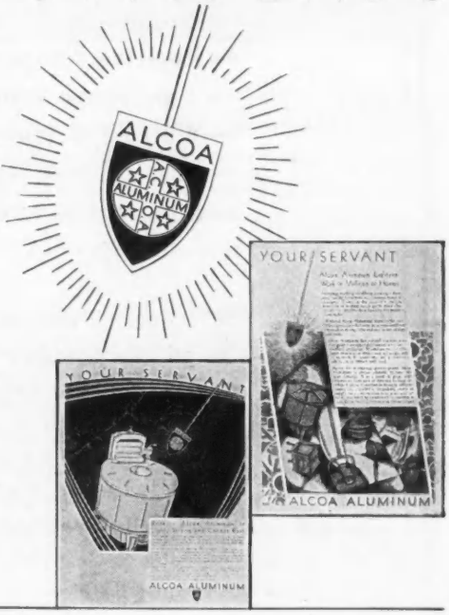
AS SHE READS . THINKS . ACTS . . . SO GO YOUR DIVIDENDS

When she buys electrical appliances, the American housewife is really purchasing leisure—a way to get work done more easily and more quickly.

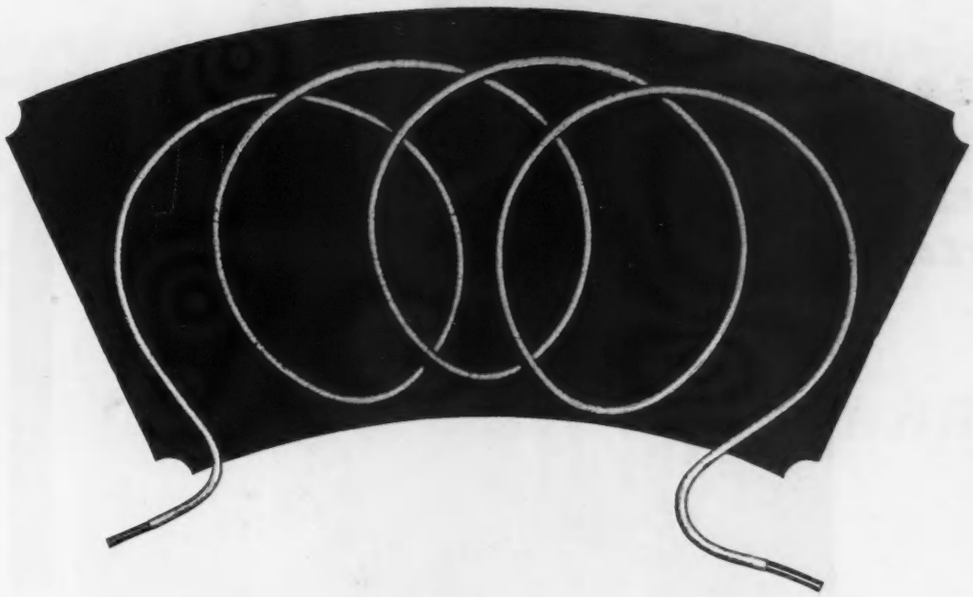
With definite likes and dislikes in mind, she instinctively passes by equipment made of heavy old-fashioned metal. Products of bright, silvery Alcoa Aluminum attract her. She has found aluminum both light in weight and extremely durable. She knows its lustre will not tarnish. She knows it will heat quickly and uniformly.

Alcoa Aluminum is her servant and yours. It serves you, because it is so obviously what your customers really want. It will serve you more and more, because a consistent advertising campaign is now appearing in Good Housekeeping, Saturday Evening Post, The Country Gentleman and other papers, explaining the many advantages of electrical merchandise made of Alcoa Aluminum.

Our nearest office will gladly tell you how Alcoa Aluminum can be utilized for maximum profit in both the manufacture and sale of your product. ALUMINUM COMPANY *of* AMERICA; 2444 Oliver Building, PITTSBURGH, PENNSYLVANIA.



ALCOA ALUMINUM



If you use Magnet Wire ROCKBESTOS now offers you —

AN ASBESTOS INSULATED MAGNET WIRE [PAT'D 1928] WITH A UNIFORM DIAMETER NO GREATER THAN DOUBLE COTTON COVERED MAGNET WIRE—SIZES 15 B&S GAUGE AND SMALLER—AT PRICES THAT WILL REDUCE YOUR COSTS.

Rockbestos has developed a New Process (patent applied for) for the insulation of small wire—the result of which is a *uniform* diameter thruout and a reduction in price. This means longer life, continuous service and general reliability for your products, *without re-designing*. It means lower production costs and wider application of asbestos insulated magnet wire to products.

ROCKBESTOS PRODUCTS
CORPORATION

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5942 Grand Central Term. Bldg., New York
903 Clark Bldg., Pittsburgh, Pa.
716 Madison Term. Bldg., Chicago
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On the Pacific Coast—Anaconda Wire and Cable Co.

ROCKBESTOS
—the wire with permanent insulation

This coupon will bring you all the needed details.

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Rockbestos Products Corp.
369 Nicoll St.
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Send samples and complete information about your new Magnet Wire.

Name _____
Title _____
Firm _____
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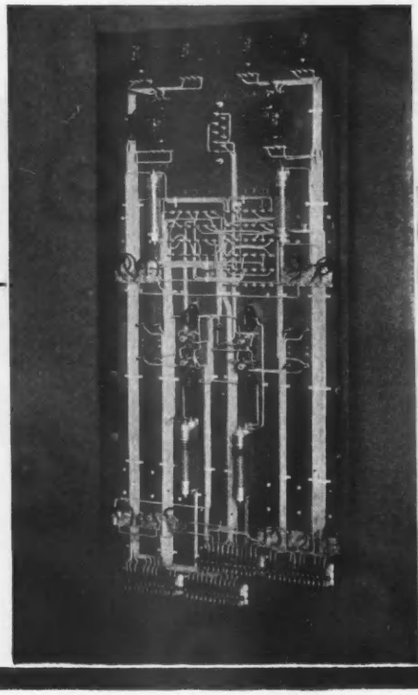
WHERE WIRING IS VITAL *FOR YEARS—*



Baltimore Trust Co. Bldg.—Deltabeston Wired!

Deltabeston

(ASBESTOS INSULATED) SWITCHBOARD WIRE

Switchboards . . . nerve centers of commerce and industry . . . must bear their loads today *and down the years.* You can put the greatest degree of permanence—and an element of General Electric dependability—into *your* switchboard with Deltabeston *long-fiber* asbestos insulated wire.

Heat has least effect on it . . . pure asbestos is compactly *felted on* by the patented Deltabeston process. Air, moisture, oil, gases do not weaken it . . . they can't penetrate the dense flexible asbestos wall filled with flame-proof compound, the tough asbestos braid jacket, the varnished cambric. Its dielectric strength is high.

Sleek grey, black or white Deltabeston wire adds finish as well as years of life to switchboards. And its price is moderate. Leading manufacturers, large and small, use it. You can tell why by testing a sample. Write Section Y-322, Merchandise Department, General Electric Company, Bridgeport, Conn.

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Electrical Manufacturing

Production - Marketing - Administration - Repairing

Volume 5 APRIL-1930 Number 4

Revamping an Electrical Business to Reduce Overhead

By CHARLES H. HATCH

Vice-President, Miller, Franklin & Co., Inc.

IT is but seldom that a going concern succeeds in keeping overhead expense continuously at the very minimum possible. The time of the management is usually and quite properly so much taken up with the details of day-to-day problems that it feels it cannot spare the time to exert constant pressure for economy upon very phase of the business.

As a result, it is highly desirable now and then to resort to a radical, wholesale housecleaning. Commonly this is brought about by a depression in business, which according to tradition is the approved expense-cutting time. Sometimes, however, it becomes mandatory as a result of profits falling off drastically at a time when business is holding up well. That was the case with the manufacturer of electrical specialties whose renovating and revamping is described in this article.

It goes without saying that reductions in overhead expense cannot safely be made haphazard. It emphatically does not pay to chop off every head or every activity that costs money. In the enthusiasm that accompanies sporadic expense-cutting campaigns, just that happens far too often with serious damage to the effectiveness of the business. The best possible judgment should be used so that pruning will be done only where it will benefit the business. The cutting should be highly selective.

Because of the complex and intimate inter-relationships that exist between the various phases of a business, an activity that, seen alone, might appear to be dispensable, may actually be of great value.

Therefore before starting a campaign against undue overhead expense it pays to make a complete survey of the entire business, covering management, production, sales, finance, buying, engineering, office, everything. Such studies have been called "industrial audits"—a name which is not wholly satisfactory as a description although it does imply the minuteness and accuracy with which they should be made.

REDUCTIONS in overhead expense cannot safely be made in a haphazard manner. It emphatically does not pay to chop off every head or every activity that costs money. In the enthusiasm that usually accompanies sporadic expense-cutting campaigns, just that happens far too often with serious damage to the effectiveness of the business. The best possible judgment should be used and the cutting should be highly selective

The electrical manufacturer whose achievements are described in this article had such an "industrial audit" made. With the exception of considerable extravagance in expenditures for "overhead" activities the company turned out to be in pretty good shape.

In fact it was fairly typical of many concerns in its industry. It had on the one hand developed an effective sales policy and organization. It had not neglected production. In fact production-wise it was quite highly organized along modern lines. On the whole its production could be rated as somewhat more efficient than average. If anything, the company was over-systematized and over-organized.

The savings in overhead were accomplished in three principal ways:

1. By the simplification or elimination of clerical and administrative methods.
2. By combining and correlating certain activities.
3. By reducing salaries which, chiefly as a result of periodical raises for length of service, had become in some instances fantastically high for the work being done.

There had been a tendency to segregate activities that could have been handled better and less expensively if con-

solidated. On the other hand, in some cases departments were doing work that could better and more logically be done by others. As is often the case, clerks and sub-executives had from time to time taken on duties, often as a temporary expedient, which had no logical connection with their other activities. Not only is this usually expensive—it frequently develops conflicts of authority and other friction that is expensive although it cannot usually be measured.

Cumbersome methods of handling necessary routine were in use in some spots chiefly because no one had seemed to have time to study those methods critically or to compare them with the most modern methods used for similar functions by other concerns.

¶ An "Industrial Audit"—Before starting a campaign against undue overhead expense it pays to make a complete survey of the entire business

In some instances executives were doing work that called for no better talent than that of a bright clerk. That was true, for example, of the credit and collection function. It seems to be a traditional belief that credit work calls for a high order of ability. Actually it is only in a comparatively few businesses that anything more than a clerk is needed.

Of late it has been considered poor taste to mention wage or salary reductions. Much stress has been laid upon the desirability, some say the "necessity," of keeping wages up so that the general purchasing power of the masses will be high. That contention is sound if production is maintained at a level commensurate with wages, or if an executive's services are demonstrably worth the salary he is paid.

¶ The Salary Attack—This is often justified where periodical raises due to length of service have boosted salaries fantastically high for the work done

When a man is promoted to a position where he can do more valuable work it is perfectly proper to raise his salary. Even though he remains on the same type of work it may pay to give him raises periodically as an encouragement. But this must be watched carefully or before long he may be getting more than he can possibly be worth. Periodically it pays to evaluate the jobs held by all executives and sub-executives to determine just what the work is really worth.

In order to show clearly just how this electrical manufacturer was able to reduce overhead more than $175,000 a year, I shall describe in not too much detail what was done in specific departments of the sort that exist in practically every electrical manufacturing business. The faults that existed are all too common; the methods used to rectify them are of practically universal application.

Purchasing Department—The purchasing department was swamped with detail. The practice was to send out a multitude of inquiries covering even small purchases and then to haggle over prices at great waste of time and with the effect of antagonizing suppliers. This was stopped. Approved suppliers of all but major lines were lined up and the business given out to them without haggling or shopping. From time to time they were checked up on price and quality to make sure that they were not abusing the purchasing agent's confidence.

Such clerical work as order typing and follow-up which had been done by the general office was transferred to the purchasing department where it logically belonged. While a centralized stenographic department is often desirable it is not universally effective or economical. This was a case where decentralization was indicated.

On the other hand the purchasing department had been attending to some clerical detail which was no proper part of its work. The checking and auditing of invoices which had been split between the purchasing department and the general office was turned over to the auditing department where it belonged. As a result invoices which had been scattered over various parts of the office were put under the control of a single woman clerk.

The net saving in all phases of the purchasing department's activities amounted to $4,300 a year. It was accomplished partly by reducing salaries and partly by eliminating the assistant purchasing agent whose work was taken over and satisfactorily handled by a clerk.

Credit and Collection Department—The credit manager, whose salary was $6,000 was eliminated and the bulk of his work taken care of by a woman clerk.

This was made possible by devising a simplified procedure and by the use of form paragraph collection letters which cover the vast majority of delinquencies. The clerk now maintains the credit files, a master control analysis of past due accounts and handles practically all of the correspondence.

The treasurer can at any time obtain a complete view of the collection situation by a mere glance at the analysis. In the rare instances when real judgment must be brought to bear on an account he attends to it. The bulk of the work is and always was mere routine. As a matter of fact the collections are now more prompt than when the old credit manager was in charge.

Net payroll reductions in the Credit and Collection Department amounted to $3,600.

General Office and Cost Departments—In these two closely allied departments there were three comparatively high salaried executives—the office manager, statistician, and cost estimator. The two latter were eliminated.

So were six girls who had been doing clerical work for the purchasing, traffic, cost and payroll departments. This was accomplished by eliminating a lot of unnecessary routine and by simplifying and consolidating the rest.

The eliminations had to do largely with needless elaboration of method. For example: A subsidiary factory ledger had been maintained in which all transactions had been recorded before passing to the general books. It was discontinued for all except inventory. The accumulation of issues of certain materials by code numbers was eliminated as it served no worthwhile purpose. In some cases there were actually more letters in the code word than in the full name of the product.

Examples of the consolidation of work: The checking of freight and express bills and similar detail for the traffic department was turned over to the traffic clerk who succeeded the old traffic manager and who was easily able to handle the checking in addition to his other duties.

¶ Executives Doing the Work of Clerks—This is often the state of affairs that exists in both the credit and collection functions of an electrical business

The two sections of the general office which prepared the payroll and computed factory bonus payments were consolidated.

The cost accounting methods in use were generally satisfactory in the results they achieved, but were much too complicated. They were simplified without any loss of essential information. The only basic change made in the cost principles was in the use of standard prices for material rather than actual prices.

The standard prices are checked up once a year. The

only prices revised during the year are those which have steadily and considerably increased or decreased. Using standard prices in cost and material control methods eliminates the necessity of carrying amounts in dollars and cents on the records and of continually changing the cost throughout the year. In order to keep the general books straight and in balance with the material and cost methods it is, of course, necessary to pick up the difference between actual prices and standard prices.

The principles underlying the application of overhead expense to the cost of the product are unchanged, but by consolidation and elimination considerable reductions have been made in the clerical work required.

The costing method formerly used was of the progressive type, that is to say, after practically every operation or when materials moved from one department to another, costs were developed. As a result, in this plant there were approximately 150 such cost points. In order to distribute material, labor and overhead expense to these unduly numerous small divisions several extra clerks were required and it was necessary to rent an expensive tabulating machine.

It was possible to reduce the number of cost points to ten, as a result of which the figuring of monthly labor and expense variation became very simple.

Formerly ledger accounts had been kept of the goods in process of each department. These accounts were debited with the month's usage of material, labor and expense and credited with the delivery of goods to finished stock or to another department. This system required monthly departmental inventories and costing out for every department through which an article passed. The multiplicity of calculations caused so many errors that from a control standpoint the system was practically useless, although it was primarily designed to secure better control.

Under the revised methods the finished goods and work in process is lumped into one account which is charged with the total expenditure for material, labor and expense and credited at standard cost when the articles are shipped. This method requires only one charging, one costing and no physical inventories.

The formerly used "burden ledger" has been replaced with expense analyses, by means of which it is possible to watch costs more closely.

The total savings from simplifying the office and cost methods and eliminating the two sub-executives and various clerks totalled more than $14,000 a year.

Development Engineering Department—Several activities, such as those of the standards department and various product engineers which had formerly been scattered over the plant and had failed to cooperate satisfactorily were grouped into a single department. As a result it was possible to effect savings amounting to nearly $17,000 a year through reducing personnel as well as duplication and conflict in work and to some extent by bringing inflated salaries down to a fair market rate.

¶ Combining Departments—The routine work of several departments can often be more efficiently performed when it is combined as an individual unit

¶ Non-Productive Labor Needs to "Diet"—In a growing business, unless watched, non-productive labor always takes on undue "weight," adding to overhead

Plant Engineering Department—This department was considerably over-staffed. For instance, three designers and a detailer were being retained on the payroll to take care of possible future activity. The chief draftsman and the detailer were superfluous and so were released.

Careful weeding out of the less competent machinists reduced that force by ten.

Net saving for this "non-productive" department—$23,000 a year.

Traffic Department—This department had consisted of a so-called "traffic manager." Much of the detail work had been performed by the general office. A clerk was hired from a local railroad freight office who was capable of routing, tracing and checking the rates and classifications. This clerk not only took over all of the detail work which had previously been done by the general office, but also the duties and responsibilities of the former traffic manager who was released. The net saving was $2,400 per year.

¶ Taking Time to Uncover Wasteful Ways—Cumbersome methods of handling routine are in use in some spots chiefly because nobody has time to study them

Productive Departments—A careful study of the various productive departments indicated that an excessive amount of indirect labor was being employed. This indirect labor consisted chiefly of instructors and inspectors. Many of the inspectors and instructors were put on direct productive labor, others were transferred and still others were discharged. It was found that much of the instruction work could be handled by the foreman or assistant foreman. In some instances the work which had formerly been handled by a special clerk was so simplified and reduced in volume that it could be handled by the department foreman or by employees in other departments such as the cost and planning department.

The assistant chief inspector of one department was transferred to the receiving department, where he replaced an inspector who was receiving a higher salary. Several foremen, inspectors and so on were replaced at substantially lower salaries. A man whose duties were to supply the production lines with material was eliminated by combining his job with that of an instructor. The total saving in overhead expense of the productive departments was in excess of $75,000 a year.

Receiving and Shipping Departments—Superfluous material moving men and packers were eliminated—a total saving of $3,500 a year.

Materials Control—The material control department was doing a great deal of clerical work, but even so, accomplished nowhere nearly what it should have. For one thing, it was not effectively controlling material. As a result inventories were much larger than they should have been. The clerical work was carefully scrutinized and changes made which would not only give positive control over materials, but would eliminate considerable clerical work. Forms were changed and simplified, maximum and minimum quantities and standard ordering quantities were set. The new methods required the efforts of only one clerk at the control files instead of the three previously required. The changes also resulted in greatly reducing the amount of clerical work to be done by the various other departments. The total saving was about $10,000 a year.

I have not undertaken in this article to describe in minute detail the changes in clerical method which were made, for the obvious reason that in no two plants would these changes be identical. The fact remains, however, that a similar questioning, even skeptical, approach in a critical study of any business will usually result in picking up similar faults. As a business goes on year after year, it is but natural that from time to time it will seem desirable to put into effect additional bits of routine. Frequently with the passage of time the need for this work passes, yet too often the work itself continues to be done.

Illustration by Courtesy of Gleason-Tiebout Glass Company, Brooklyn, N. Y.

Illuminating Glassware

How It Is Made

Methods and Materials Used in Manufacturing Illuminating Glassware

By WILLIAM C. HIRSCH

GLASSWARE has been used for illuminating purposes for years and yet there have been few important changes in the making of this product for ages. New developments in the art of illuminating engineering have forced the manufacturer of illuminating glassware of today to combine his knowledge of chemistry, ceramic engineering, pyrometry, the fine arts, and decorative design with those of the fundamentals of illuminating engineering, thus complicating manufacturing methods and the use of materials to accommodate present practices and demands

NO other class of products used in the electrical industry embodies in a higher degree the craftsman's skill paired with scientific control of processes by technologists and the genius of the artist than does illuminating glassware. In illuminating glassware plants, the best traditions of the medieval artisan find expression by the side of ultra-modern scientific research. Here the romance of industry has full sway. Glass-blowers, using pipes, much the same as those in vogue at Venice at the time when Columbus set out to discover a New World, and using lung-power just as did their predecessors of the Middle Ages, transform raw material mixtures, that have been worked out with mathematical precision by highly efficient laboratory methods, into spherical, translucent shapes to which subsequent treatment in modern annealing furnaces imparts the requisite strength and decorative ornamentation. Let us first see what makes up the principal raw materials used in the making of illuminating glassware.

Sand is the most important ingredient of the glass batch, the name by which the compounded mixture ready for the refractory pot is known. A very pure variety of sand it has to be, free from all organic matter. The size of the grains must run uniform and the silica content must be high. Suitable glass sand deposits are found in New Jersey, Pennsylvania, West Virginia, Illinois and Missouri. The sand is carefully washed and screened at the source of origin. When it arrives at the glassware plant, each car is sampled and analyzed for its silica and iron content. The former must be high, the latter as negligible as possible.

Next in importance to sand is soda ash, chemically pure sodium carbonate. Lead oxide is added in the form of red lead which gives density and refractive power to glass. Sodium nitrate, or niter, as it is called for short in glass plants, is introduced into the batch to oxidize and thereby render immune organic matter, to prevent the reduction of the lead, and to speed up the melt. Alumina are supplied in the form of china clay, cryolite, aluminum salts, or feldspar. Borax adds to the durability of the glass and also operates against excessive hardness of colored glass. Fluorspar serves chiefly as a flux.

The most interesting among the raw materials used in the making of illuminating glassware are, however, the coloring agents, comprising a wide range from the relatively lowly manganese, which yields purples chiefly, to gold used in the making of gold ruby glass. Copper oxide, at lower cost, yields copper ruby glass and selenium, a ruby that comes very near being a match for that produced by the use of gold. To name the roster of coloring agents used in the manufacture of illuminating glassware would take too much space.

Perhaps the most costly feature of the manufacture of illuminating glassware is the bringing out of new colors and textures. Dr. Alexander Silverman, head of the Department of Chemistry of the University of Pittsburgh, and a recognized authority on glass technology, in a recent address before the New York Section of the Illuminating Engineering Society mentioned the fact that $60,000 was expended by one manufacturer in developing a new type of glass before a piece of ware made from it was marketed. Very often new shades and hues, long sought after in vain by the research worker in the glass laboratory, unfold themselves as the result of an accident. Dr. Silverman, in the address referred to, mentioned having discovered an entirely new color combination as the result of a piece of glass on which he happened to be working dropping from his hands and breaking. When he picked up the fragments, he found that by overlapping them the color effect was completely altered.

Amid the most painstaking control, the different materials entering into the glass batch, plus a certain amount of cullet or scrap glass, all milled uniformly and properly blended, are placed in a glass pot, a large hollow container made of a special mixture of refractory clays. These pots are made by hand and the utmost care is taken to build them so that they will withstand as long as possible the rigorous service to which they are subjected. The clay mixture is aged, and aged again between the various steps of forming the pot. When the bottom of the pot has been built, the clay is allowed to dry, and then section after section is superimposed, further intervals for aging being allowed between the joining of one section to another.

Proper joining of a glass pot is considered the job that calls for the highest skill in the clay-working industry. When finished, the pot looks like a beehive. From the time that the bottom of the pot has been formed until it is finished weeks elapse and many a New York skyscraper has been reared in the time that elapses between the numbering of the pot for identification and its being considered fit for shipment to the glass plant, a period that is never less than six months. And the average lifetime of a glass pot is much less than that many weeks.

When the pot has been filled with the batch, it goes to the furnace which usually is of the recuperator type, the waste gases being utilized for preheating.

The melting points of glass-making substances have a wide range, that for niter being 316 deg. and for alumina upward of 2000 deg. C. The temperature at which illuminating glassware batches are burned or melted is upward of 2000 deg. Fahr. The melting period is approximately 20 hours. Samples of the mass are examined, especially for enclosed bubbles. When the glass is "fine," the process of shaping begins.

Gathering the proper amount of glass for the desired piece on the end of his blow-pipe, the glass-blower rolls it over the "marver," a hollow block of wood. This helps

to form the glass mass into a well-rounded, symmetrical pear-shaped body. Without removing the pipe from his lips, the glass-blower twirls the "pear" around and around, at the same time subjecting it to moderate inflation. All of a sudden, his cheeks bulge out to the limit of human capacity. The yellowish sphere has attained the proper size and color for the mold. The blower ascends his slightly elevated stand, holding his pipe with the precious "pear" at its end aloft. Below him stands a helper who has opened the mold which is to give the glass its permanent form. Into it, the blower deftly inserts the "pear," lowering the pipe, which still remains between his lips. By his side he has a compressed air feeder. Simultaneously almost he forces compressed air into the mold for one final extension of the "pear" to the limits of the mold walls and cracks off the "overblow" which extends beyond the closed mold with a quick movement of his pipe, which is withdrawn together with the compressed air feed. The helper, of course, has closed the mold at the very moment when the blower had the "pear" safely inside of it. As soon as the blower has separated the "overblow," the helper opens the mold, bringing forth the formed globe.

From the foregoing it will be seen that these molds play a vital part in the manufacture of illuminating glassware. The mold department is indeed one of the most important of such a plant. The designing of the molds, the preparation of Plaster-of-Paris and wood models and the final casting of the molds of malleable iron are all operations calling for a high degree of skill and understanding of the peculiarities of glass. The finished cast-iron molds are machined and to some extent decorative effects are attained through mold design, although the range of such embellishment is rather limited.

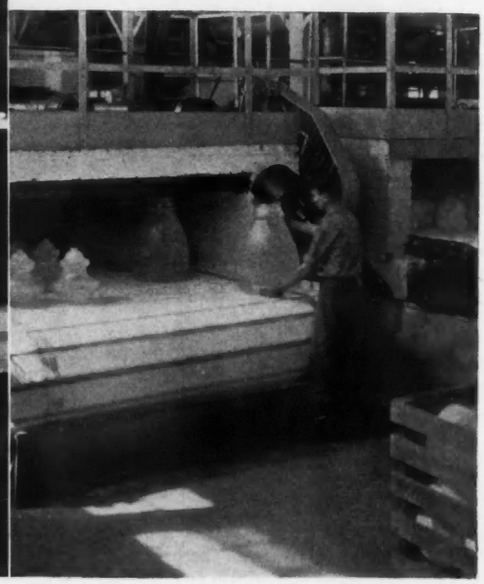
From the glass-blower the illuminating ware goes to the annealing furnace or "lehr" where strains are removed and the physical properties of the glass materially enhanced in quality. There remain a few finishing operations. There still may adhere to the formed piece some of the "overblow." This is removed by passing the globe at the exact spot of this superfluous appendage over a gas flame. It heats the exceso part and the operative taps it gently with an emery stone which causes the last of the "overblow" to drop off. Grinding and smoothing wheels serve to insure smoothness and accuracy of edges for fitting into the metal parts of fixtures.

Decorative effects are obtained by a number of different processes. Engraving by passing the glassware over a rotating cutting wheel permits of artistic treatment of a high order. Etching is a method of decorating glassware by the chemical action of hydrofluoric acid, the portions which constitute the design being exposed to the acid, while the remainder is protected by a coating of wax or kindred material. Patterns, very much on the order of decalcomania, are used for some of these decorative effects. A much more expensive method of decoration than etching is that in which ornamental effects are obtained by applying colors in artistic designs by hand, and then firing the ware in a decorating kiln of the muffle type at a relatively low temperature. Coin gold is frequently applied by this method, although it is a somewhat costly process.

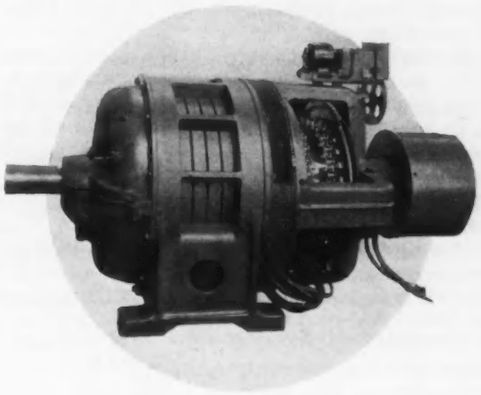
Progress in the realm of illuminating engineering has added to the demands made upon the illuminating glassware manufacturer. To his knowledge of chemistry, ceramic engineering, pyrometry, the fine arts, and decorative design he has had to add the fundamentals of the profession which deals with lighting problems from the physiological as well as the economic angle. This child of the Twentieth Century has linked arms with the majestic figure of the glass-blower, almost as old as civilization itself. In the illuminating glassware industry the ages meet.

AFTER the many different pieces of illuminating glassware, in their many different shapes and forms, have been blown into the molds by the glass-blowers, they are placed in lehrs for annealing. The loading and discharge ends of a typical lehr are shown in the illustrations directly below

THESE lehrs are little more than large ovens and the glassware passes through them on endless conveyors. The time required for annealing depends largely upon the type of material. The glass-blower in the center is shown forming a large cylinder which is afterward cut into cylindrical sections



Motor Selection and Protection



In the selection of motors and control apparatus for industrial applications there are many highly important factors to be considered.

By H. L. Smith
Industrial Engineering Department, General Electric Company

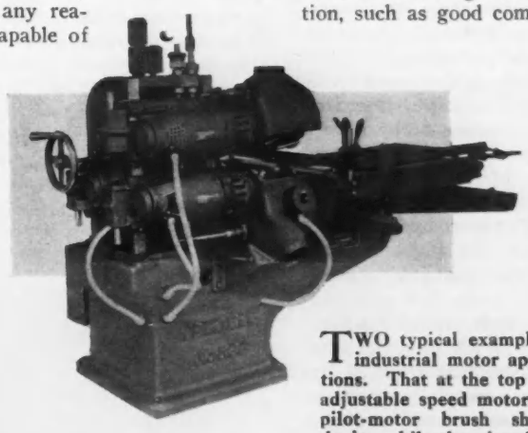
"WHICH type of motor is best for my purpose?" In answering this question, it is necessary to determine the requirements of a motor which is to operate successfully under given conditions. When considering permanent installations it is always economical to make a preliminary study of the conditions to be met, that an intelligent application of motors may be made and suitable devices installed for their protection.

A motor develops torque and speed, the two elements required to drive any load, but temperature rise must also be considered. To operate successfully, a motor must be of such size and design that it will start and accelerate under any reasonable load which it may be called upon to bear, carry any reasonable overload and also be capable of carrying its normal load for the period of time required without bringing about a temperature rise which would cause deterioration of the insulation.

In selecting a motor, the starting and accelerating torques should be a primary consideration. After the starting torque requirements of the driven machine have been determined, the ratio of starting torque to normal torque should be considered. This ratio, if relatively large, indicates that a slip-ring or high resistance rotor alternating current motor is preferable to the standard squirrel-cage motor, and a compound or series wound direct current motor should be selected in preference to a shunt-wound machine. A similar method may be used for service requiring frequent starting, and careful consideration of the starting and accelerating torques frequently permits the selection of a motor of a smaller horsepower rating than could otherwise be employed.

The point of next importance is the peak load which may be encountered. Ample margin must be allowed between the requirements of the driven machine and the maximum torque developed by the motor. For example, if an induction motor were selected with a maximum running torque only slightly greater than the peak load, it is quite possible that the motor would stall if the voltage should fall, at the time this peak load occurred.

The next consideration is the horsepower rating. This is a measure of the motor's ability to do the required work for a specific period without exceeding the safe heating limit or violating other requirements of successful operation, such as good commutation.



TWO typical examples of industrial motor applications. That at the top is an adjustable speed motor with pilot-motor brush shifting device while the view below shows three built-in motors and control apparatus

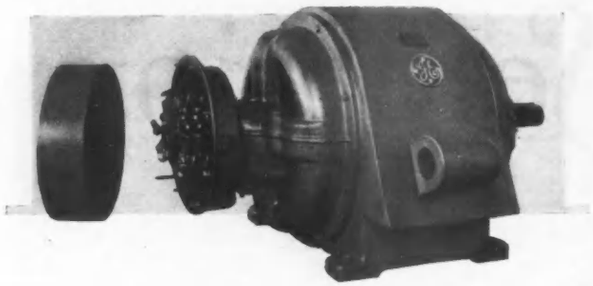
It might be noted here that neither of the ratings, whether 40 degrees or 50 degrees, indicates the temperature rise which will be obtained, but simply the limit of the temperature rise which should not be exceeded.

The great number of available alternating and direct current motors can, from a standpoint of speed, be divided into four groups as follows:

1—*Constant-Speed Motors:* The speed of these is either constant as with a synchronous motor, or does not vary materially with the load, as in the case of squirrel-cage motors, slip-ring motors with rings short circuited, and shunt-wound direct current motors.

2—*Multi-Speed Motors:* These may be two, three or four-speed and may be operated at any one of the several definite speeds, each being practically independent of the load. Examples are direct-current motors with two armature windings or induction motors with primary windings capable of various pole groupings.

3—*Adjustable-Speed Motors:* This group covers motors



whose speed can be varied gradually over a large range and, when adjusted, remain practically unaffected by changes in load. Shunt-wound motors designed for speed variation by field control and alternating current brush-shifting motors with shunt characteristics are in this group.

4—*Varying-Speed Motors:* The speed of such motors varies with the load, ordinarily decreasing as the load increases. This covers direct-current series motors, compound-wound motors with light shunt fields and high resistance squirrel-cage motors. As a sub-class of these varying-speed motors there is the adjustable varying speed motor, the speed of which can be varied over a wide range, but in which the speed, when once adjusted for a given load, will vary greatly with changes in load. Examples are the slip-ring motor operating with resistance in the secondary circuit and the alternating current brush-shifting motor with series characteristics.

Advantages of Alternating Current Motors

WHETHER alternating current or direct current motors will be used is generally decided by the type of power available. As most central stations generate alternating current, it is desirable to use alternating current motors. The alternating current motor has the advantage of being very simple and of sturdy construction, as well as having a low first cost. For constant-speed service, the squirrel-cage induction motor is the simplest and is suitable for all applications where the torque required during starting is not abnormally high; the squirrel-cage induction motor is therefore the most common motor to be found in any industrial plant. Its one disadvantage is the high current drawn at starting, and, in motors above 7½ horsepower, it is usually necessary to reduce the voltage applied across the motor terminals at starting. This may be done by inserting resistance in series with the primary winding or by means of a compensator. The first, which is a resistance starter, is cheaper and well adapted for motors up to 20 horsepower, provided the starting torque required is low (50 per cent of full load). Above this, however, the compensator is more desirable as it has the advantage of a higher torque per ampere of starting current than the resistance type of starter.

A line of squirrel-cage motors is now available which is suitable for full voltage starting. With this type the starting current is greatly reduced from that required by the standard type squirrel-cage motor, especially on high speed units. In the smaller sizes, these motors are designed to give a high starting torque, making them especially suitable for many loads which formerly required the use of slip-ring motors. This type of motor is being widely applied for driving power station auxiliaries, large because of the simple control required, consisting of a line switch only.

On loads requiring comparatively high torque during starting, it is best to use a slip-ring induction motor, although there are certain cases where high resistance, squirrel-cage motors are suitable. The slip-ring motor has the advantage that the current during acceleration can be limited, this being usually an average of 125 per cent of full load current. This makes a slip-ring motor especially suitable for large sizes and where the capacity of the system is comparatively small, or where the motor is located at the end of a long feeder.

The slip-ring motor is also used where the equipment must be operated at different speeds, these motors being suitable to operate down to 50 per cent speed by inserting resistance in the secondary. It is not advisable to reduce the speed below 50 per cent as the motor has a series characteristic with resistance in the secondary, which may cause instability at less than 50 per cent of full speed.

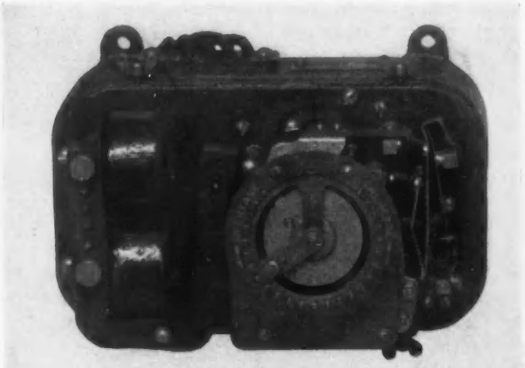
When a slip-ring motor is operated at reduced speed by using resistance in the secondary, power is wasted in this resistance, this power being practically proportional to the reduction in speed. When the load is such that the motor must be operated for long periods at greatly reduced speeds, it is often more economical to use a brush-shifting type of motor which has a very much better efficiency, as well as power factor, than the corresponding slip-ring motor at reduced speed. For this reason, a great number of series type alternating current brush-shifting motors have been used for driving mine fans and forced draft fans in power houses.

Characteristics of Synchronous Motors

THERE are now two types of alternating current brush-shifting motors, one with the series characteristics and the other with a shunt characteristic. The former is very suitable for such loads as fans and pumps. The shunt type, as its name implies, has a very small change in speed with changes in torque after the speed has been adjusted for any particular load. As well as being adapted for driving fans and pumps, this type of motor is especially suitable for driving stokers, tube machines and calenders in rubber factories, tentering frames and calenders in textile mills, cloth printing machines, bakery machinery, aluminum foil machines, and some steel mill main roll drives. This motor is especially suitable for any load requiring adjustable speed on which the variation of speed with changes in load must be small.

Another type of alternating current motor which has a wide field of application, but which has not been as extensively used as the induction motor, is the synchronous motor. This type has a constantly increasing scope of usefulness. Among the various applications may be mentioned the driving of motor-generator sets, air and ammonia compressors, pulp grinders, stone crushers, centrifugal and reciprocating pumps, fans and blowers, tube, flour, rubber and cement mills, etc.

The synchronous motor is especially suitable for direct connection to machines operating at relatively low speeds. An induction motor, when designed for a great number of poles to operate at a low speed, has a very poor effi-



The motor shown at the top of the page is of the induction type fitted with outside inclosed collectors, while the device in the illustration above is a definite time relay

ciency in small sizes and an even worse power factor. The synchronous motor for the same condition has a relatively good efficiency and is even cheaper. For this reason, the synchronous motor has probably found its greatest field in driving low speed machines similar to air and ammonia compressors.

Synchronous motors today are made self-starting and synchronizing and are equally as reliable as induction motors. One distinct advantage of the synchronous motor is that it can be operated at unity power factor or at a leading power factor. Operating at a leading power factor, these motors furnish reactive k-va. for power factor improvement at a minimum cost.

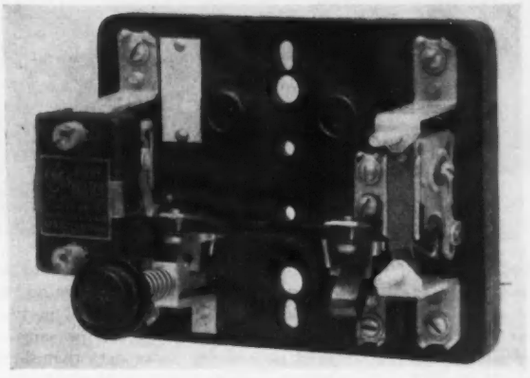
Investigations are continually showing that most plants are over-motored. Often a rearrangement of motors, allowing each motor to operate close to its rated load, will result in a marked improvement of the power factor.

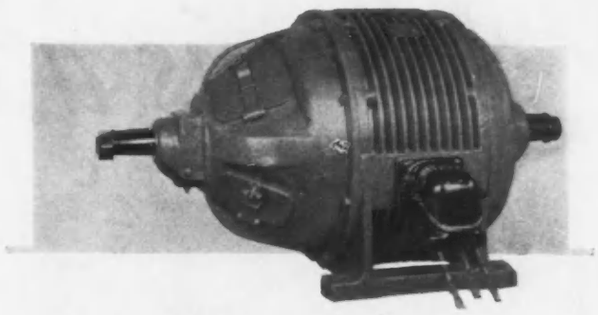
There are usually certain steady loads in most industrial plants to which an ordinary synchronous motor can be applied and operated at leading power factor to supply the reactive k-va. for power factor improvement. In connection with power factor improvement it may be noted here that, if synchronous motors cannot be applied, the necessary amount of leading reactive k-va. can be readily secured by means of either synchronous or static condensers, allowing the motors, in general, to be of the simplest possible type.

Special Types of Motors

AS a synchronous motor operates as a squirrel-cage induction motor in starting, it is not suitable for starting heavy loads. A special type of synchronous motor has been developed, known as the "super-synchronous" motor, to meet these conditions. The essential difference from the ordinary synchronous motor is that the stator frame is so arranged that it can rotate and is also supplied with a hand brake. This motor is started in exactly the same manner as an ordinary synchronous motor, but instead of the rotor turning, the stator revolves and comes up to full speed, at which time field voltage is applied and the motor is synchronized. The hand brake is then applied to the stator, gradually reducing the speed, the rotor starting up at the same time. The braking on the stator is increased until finally the stator comes to rest, at which time the rotor is revolving at synchronous speed. The great advantage of this motor is that it exerts maximum pull-out torque for starting and accelerating the load, making the motor well adapted for drives which are entirely unsuited for operating by the standard type of synchronous motor without requiring the use of magnetic clutches.

The direct-current motor most commonly used is the shunt-wound type, applicable for all drives demanding constant load and where rather close speed regulation is required. This type of motor should also be used where adjustable speed is necessary. The compound-wound motors should not be used for adjustable speed service, but are suitable for adjustable varying speed or so-called constant speed. The compound-wound motor is especially applicable where loads demand high torques for heavy starting duty. Series motors are used where high torque is demanded and where high speeds and light loads are not objectionable; these motors, however, should never be belted.





The two illustrations on this page show an induction type motor with splash-tight covers for use in marine service and a motor control device known as a temperature relay

Motor Protection—There are three different means of overload protection: (1) Fuses; (2) overload relays—instantaneous trip, and (3) overload relays with time delay. These last may be of the thermal type (either adjustable or non-adjustable), in which the time delay is inherent, or of the plunger type, in which time delay is secured by a dashpot or bellows.

The fuse is the oldest form of overload protection and possesses a certain inherent time delay, i.e., it will not blow instantly at current in excess of its rating but, if this excess current is left on long enough, the fuse will blow. This time interval, however, varies considerably with the same rating of fuse made by any one manufacturer and the same rating of fuse made by different manufacturers. Due to this inconsistency in fuses, they do not give proper overload protection for motors.

Types of Motor Protection

SQUIRREL-CAGE induction motors, the most popular motor in this country today, take from five to eight times full load line current when started on full voltage and, even when started by means of a compensator or resistance type starter, take two or more times normal current. Thus, any fuses protect only against short circuit in such service, unless a double-throw starting switch is used, and even then the chances are that the constant blowing of a fuse will result in the use of larger fuses until, eventually, no overload protection is provided.

On slip-ring motors and direct-current motors a fuse of about 125 per cent full load motor current is used and is generally satisfactory in starting, but the same general statement applies, i.e., the constant blowing of a fuse on overloads will result in the substitution of a larger fuse. Although a fuse does not give proper overload protection for a motor, it does give very good short circuit protection and is therefore well adapted for use in conjunction with other types of motor protective devices.

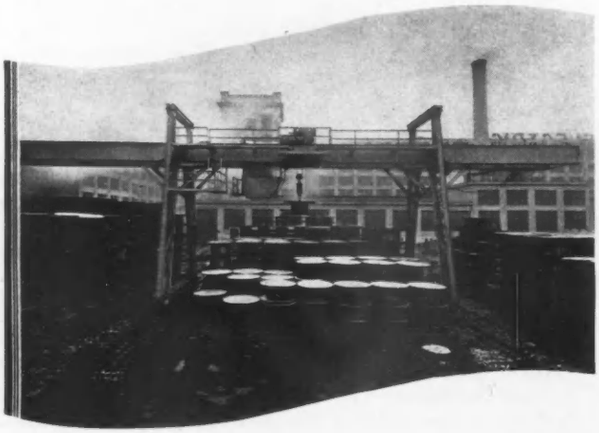
The second form of protection is the overload relay with instantaneous trip. This trip is usually set at 160 per cent full load current and should only be used for special applications where the device must be stopped instantaneously at a certain load.

The third form is the overload relay with time delay. On squirrel-cage induction motors, this must be set so high as not to trip under starting conditions, and this setting is usually 125 per cent of full load. On direct current and slip-ring motors a setting of 110 per cent full load generally takes care of the starting conditions. It may be pointed out here that this type of relay has both a current setting

(*Continued on page 82*)

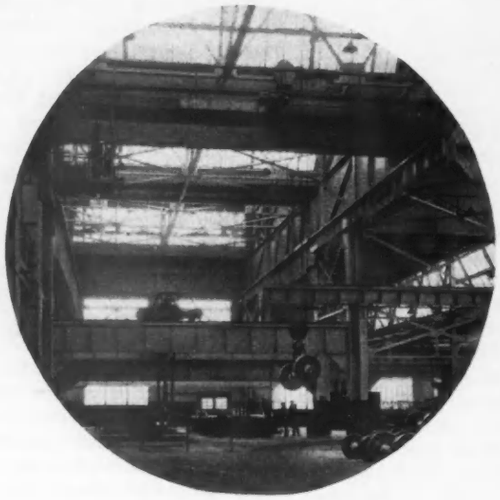
Here is a Market for

Cranes and

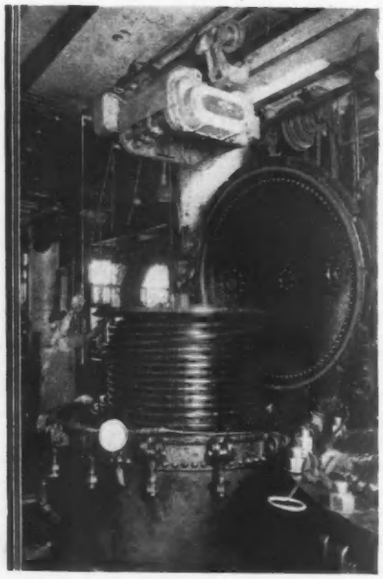


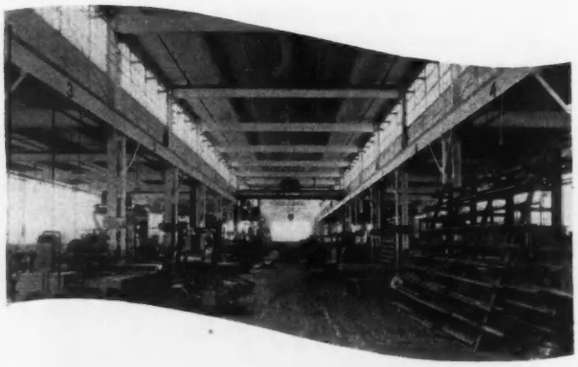
There is an ever increasing tendency on the part of manufacturers in every industry toward the more general use of mechanical handling equipment, which is clearly reflected in the data published on the subject in the 1927 Census of Manufacturers

These data show a steady growth in the number of cranes and hoists in use and in the values of these devices manufactured since 1921. Cranes (including hoists and derricks) produced in 1921 had a value of $20,445,484. In 1927 this amount was doubled, reaching $44,453,900



There is scarcely an industry today that does not have some use for handling equipment. Manufacturers of cable use it for moving cable reels and for impregnating cables; street railway repair shops use it for handling car parts and it is used in electric motor building for handling armatures and motor frames



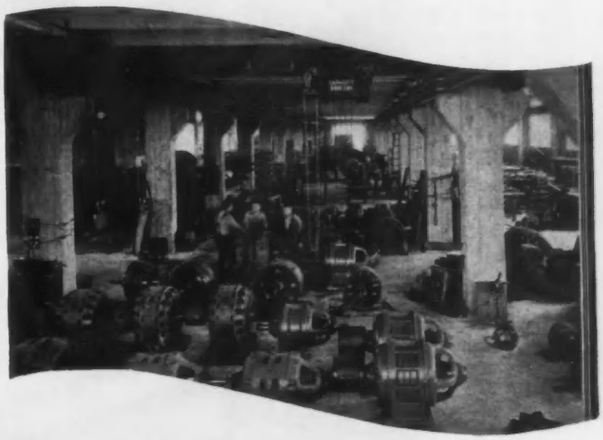


It would appear from the data available that traveling cranes manufactured in 1927 had less value than those made in 1925; their values being respectively $18,607,007 in 1927 as compared with $19,172,740 in 1925. The value of locomotive cranes made in 1925 was $13,161,678 and but $13,506,413 during the year 1927

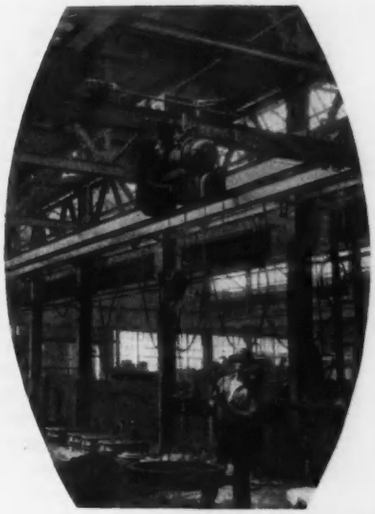
Stationary cranes and hoists manufactured in 1925 had a value of $11,601,245 and this increased in 1927 to $12,340,480. It should be considered in studying these data that these values include the cost of much electrical equipment in the way of motors, switches, wire, thermostats and considerable other electrical apparatus

Electrical Equipment

Hoists

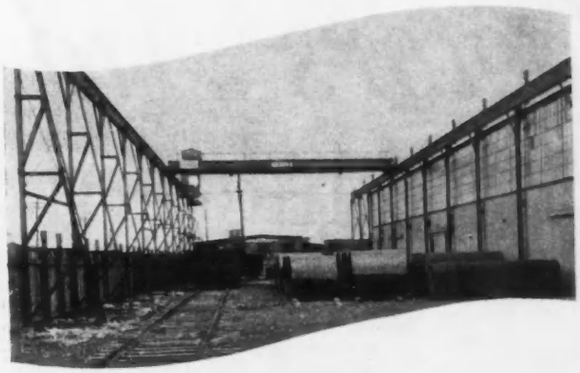


In motor repair shops, and particularly in the receiving, shipping and storage rooms, mechanical handling equipment in the form of cranes and hoists plays a very important part in the moving of motors, as may be seen in the illustration above

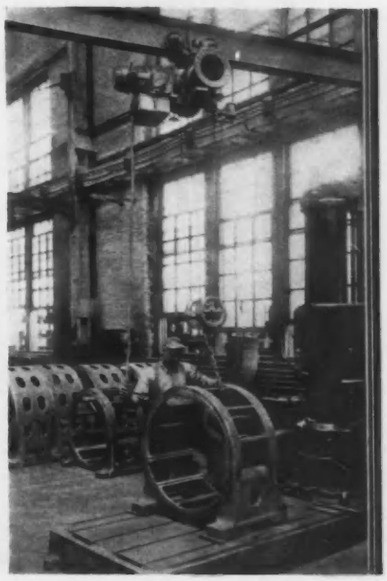


Foundries are extensive users of both cranes and traveling hoists for the handling of molds and heavy flasks, as is evident from the illustration directly above and that at the right, which are two views showing some of the many advantages of the use of these devices in this branch of industry

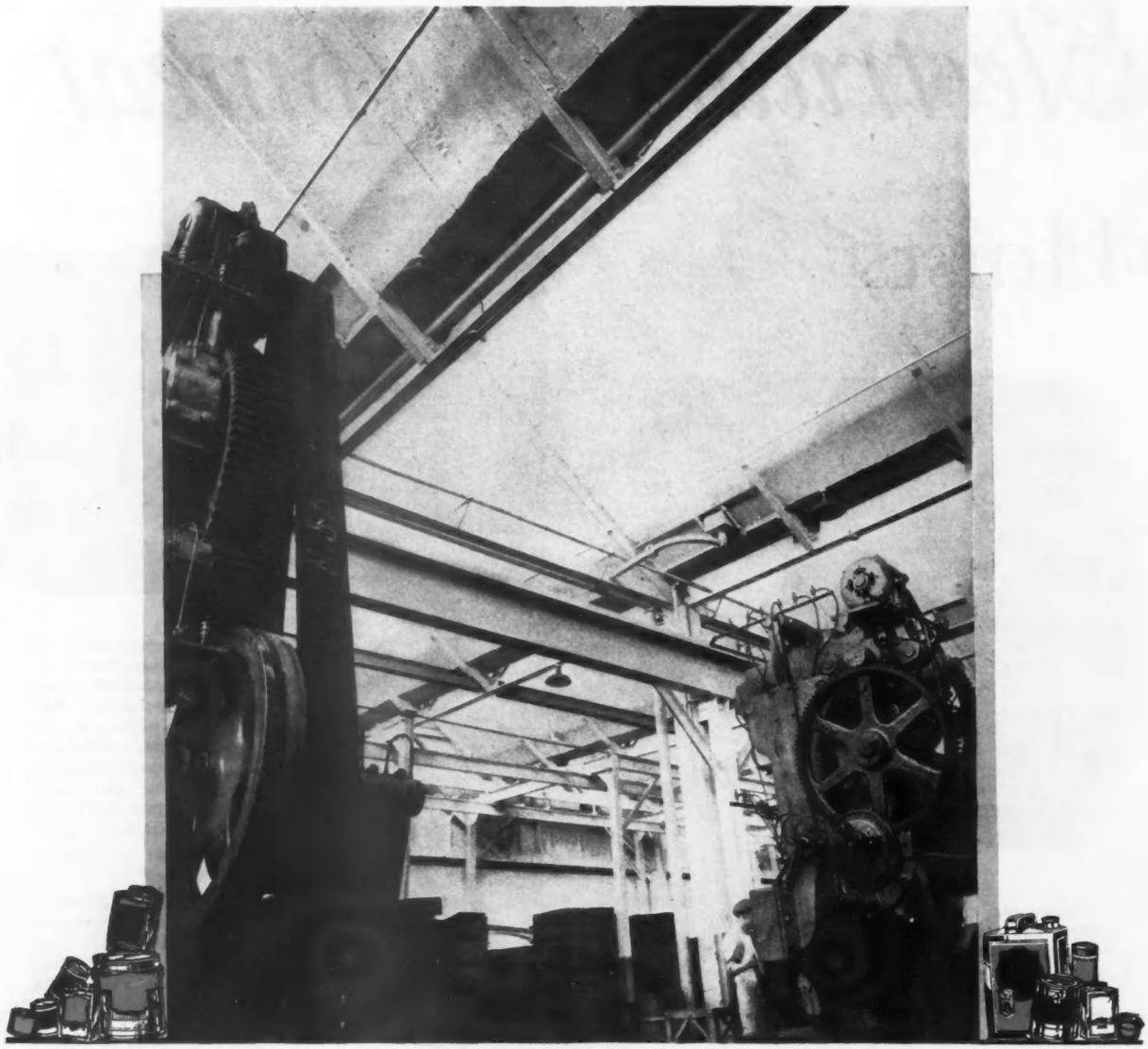
Aside from the advantages to be derived from the use of cranes and hoists, insofar as the saving of time in production is concerned, there is the side of safety to be considered as well as the saving to be derived from the elimination of much manual labor



Traveling cranes, equipped with electric hoists, find extensive use in the loading and unloading of cars, especially if the cars are of the open type and the cranes are fitted with electromagnets for lifting scrap materials and other metal. One installation of this kind is shown above for handling materials of this kind



Electric motor manufacturers find both stationary and traveling cranes of particular advantage in the handling of large motor frames and parts, such as that shown at the right. This is an example of how mechanical handling equipment serves a large radial drill employed in machining and finishing electric motor frames



Paints and Colors Aid in Increasing Production

By T. J. MALONEY
The New Jersey Zinc Company

THIS era that specializes in "dissatisfaction" (consumer dissatisfaction) to continue the demand which stimulates production, found paint an ideal aid. Not paint as paint—but paint as color—as the easiest and best method of applying and changing color. It worked so well into all sales propaganda that color became a dominant style factor in other things than textiles. Electrical equipment, from the orange light bulb to the striking crimson generator, was a leader in promoting color because of its sales appeal.

So much for sales. But what use has been made of paint, and more particularly paint color, to increase production efficiency—the primary step in electrical or any other manufacturing? Has paint been skillfully applied to machinery, workrooms and rest rooms to give the workman better light, and proper mental and physical relaxation?

After visiting numerous plants, it was evident that plant management is striving to create the proper working condition for the man and woman in the shop. Some have made greater progress than others, but all are surely arriving at a goal of easier production, through more enjoy-

able working conditions. That painting is a basic way of achieving this end all agree.

At Atwater Kent there is a two-story structure with the top story of saw tooth construction, and at The General Electric Co. there are multiple story, saw tooth, monitor and practically every type of building. The same conditions exist at Westinghouse Electric. The electrical manufacturing industry is so large and produces such a multitude of varied, wide range products, it can utilize every building type to advantage. There is no standard.

Interiors, even in the lightest of plants, are painted with either white or light tint paints. The light reflection factor, so well understood throughout the industry, finds white paint the predominant wall and ceiling covering. Dado (lower portion of the wall) colors range from black, through the olives, blues, grays to no dado at all—white throughout. The top story at Atwater Kent is merely the single story saw tooth roof building atop another story instead of the ground. On the two average winter days the writer visited the plant no artificial illumination whatsoever was used. The walls and ceilings were painted white, the dado and machinery olive. On the ground floor, the same color scheme was followed.

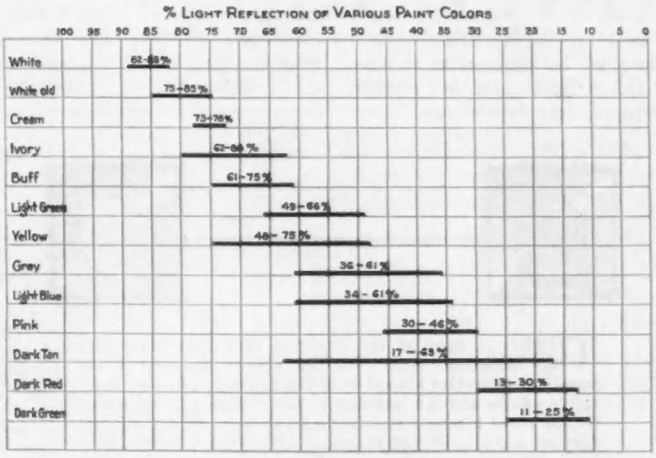
The General Electric Co.'s new plant at Philadelphia, a six-story building, is painted a cream color throughout. The building was designed to admit a maximum of daylight. After erection cream was chosen instead of white, because calculations showed that with excellent lighting there would be no appreciable loss even though cream is not as good a reflector as white. And cream is a bit warmer and cheerier than white. This policy is sound and intelligent. White has become almost a fetish, and newer construction which incorporates adequate daylighting allows a choice of the colorful light tints, so cheerfully used in modern homes.

An interesting example is the present general office of a large electrical manufacturer. Realignment of production sections was necessary, and the offices were moved into an old manufacturing section. Saw tooth construction and a southern exposure made it very light indeed. The walls, which were white, were repainted a pea green. The floors of hardwood were repolished and carpets laid. The slopes of the ceilings were covered with loose hangings for decorative and acoustical effect. It became a light and quiet office with an individual atmosphere.

The Detroit Steel Products Company has demonstrated that the outside slopes of saw tooth roofs can materially aid interior lighting if they are painted white. Instead of absorbing daylight (as most dark roofs do), they reflect a large portion of this light, through the upright skylights opposite.

The same principle is applied by an electrical manufacturer, to multiple-story buildings which are gathered or built around a court. The brick walls around the court are not left the same red color as the remainder of the building, but are painted white. The interior of the building receives the benefit of the sunlight when its rays reflect from these surfaces. Lighting efficiencies have been increased over 35 per cent in this manner.

Another type of building—one high story, direct overhead and monitor skylights, main crane bay down the cen-

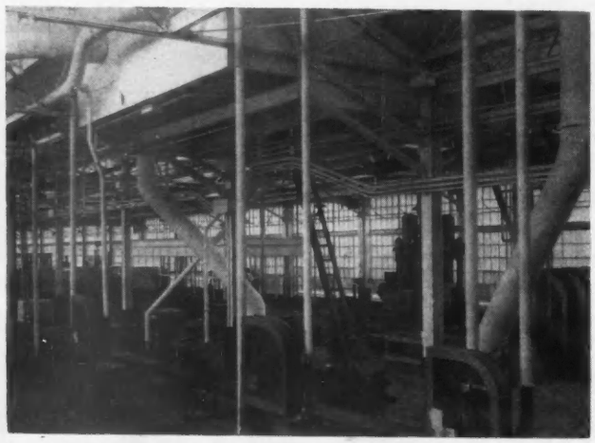


IN selecting paints and colors for industrial applications, it is well to know the light reflecting qualities of the different tints. For this reason, after considerable research and experimentation, the chart shown above was produced by the General Electric Company as a guide. It gives the light reflection in percentages for many different paint colors. Below is a good example of the use of color in an industrial plant. Here the walls and ceilings are painted to give better light reflection

ter and galleries on either side—is used wherever heavy machinery is assembled. At the Westinghouse Electric & Manufacturing Company, both the galleries and main bays are painted white. The effect is pleasant and the interior is a close reproduction of outside lighting conditions. The skylights are of glazed glass, to eliminate direct sun glare, but a passing cloud causes the interior to darken in the same proportion as the outdoors. The white walls and ceiling reflect the light so naturally and realistically that the effect wanted—as close to satisfactory daylight conditions as possible—is achieved.

Considering paint solely as to its light reflecting efficiency, it is of more value in older buildings than in new. In the latter, light needs the aid of light paint, but modern windows and illumination lessen absolute dependence. Many buildings erected before these aids to human efficiency received proper consideration, have inadequate window and skylighting for daylight, and the illumination system is poorly devised. Here white paint—a lithopone zinc oxide pigment base paint, washable and durable—is a tremendous asset. It will eliminate any waste of the already inadequate light and will do more than any other medium to brighten up these interiors. Even proper artificial illumination must have it as the reflecting background.

THERE is more to the selection of paints and colors, for industrial uses than the choice of color alone. Some consideration should be given to color schemes, decorative effects and the fact that proper selection often makes for far more pleasant surroundings, thereby increasing production and eliminating fatigue. All of these factors have been proved in actual tests. Then, too, there is the matter of selecting paints and colors that will not be affected by gases, fumes, oils and cutting lubricants, in that these may cause discoloration after short periods of time. The illustration below shows a factory interior in which the walls and ceilings are painted white and the machinery a darker tone, lending a striking contrast to the color scheme



An interesting application is found in the cellar of a storage building at the Westinghouse plant in East Pittsburgh. There is no daylight illumination. The ceiling is very low, not over eight feet above the floor and is constructed in a series of arches. When lights were hung, and reflectors used, the only place fully lighted was the floor. The rays of light following the line determined by the angle of the reflectors, left dark spaces everywhere in the room, above the point where two beams met. The reflectors were discarded and the white ceiling itself was used as a reflector. A uniform distribution of light from ceiling to floor was achieved. The ceiling is kept very white, reflection is excellent, and never spotty.

All of the efforts so far cited have one prime objective—more light. More light so that the workman can see with ease, the inspector detect any flaw, the speed of production be kept at a maximum while rejections are at a minimum.

But the individual is no machine. Even an atmosphere of vivid light and cleanliness, while beneficial and necessary may become boring. It is well worth while to consider the possibility of some sharp contrast during his recreation period to offset any monotony and resultant mental fatigue. The food products manufacturers, whose plants are spotlessly white throughout are better versed than others in this fatigue factor. At The Beech Nut Packing Company the plant cafeteria is a complete change from working interiors. The walls are finished in a mottled green wall texture. At Schrafft's new Boston plant, the dado is red, the walls buff, and an Egyptian decorative motif used. The general superintendent says a careful check up of working conditions and production speed in the late hours of the afternoon shows a decided decrease in fatigue, and a resultant normal rate of production, instead of the much lower rate that used to be maintained during these hours compared with the rest of the day.

Glare can be another distressing factor. On walls and ceilings, however, glare isn't always an important item. Particular attention has been given to walls with gloss finishes on bright days, and noticeable effects were found, other than a trifling harshness, on the eyes. Workmen accustomed to this condition are unconscious of any distressing effect—though that does not certify the absolute lack of it.

Throughout industry both gloss and flat white lithopone zinc oxide paints are used. Glare becomes a more noticeable item when an aluminum paint is used. This makes it an admirable paint for machinery trim, etc., from the color standpoint, but since its light reflection value is much lower and glare greater than either a flat or gloss white paint, it is not as desirable as an interior surface covering. And the metallic feeling makes it lack the warmth of the light tint paints.

The illumination value of various paints is shown and explained in the accompanying chart. While of utmost value, the data are cold, and if light reflection were the only characteristic of paint color, it would leave the workman cold too. The psychological value of paint color must not be overlooked by the engineer. Red is exciting—blood, fire, danger are immediately associated with it. Green is cooling—nature's soft background, yellow warm and cheering, purple subduing, orange stimulating, blue sobering. When machinery, tools, benches and desks are to be painted, and light reflecting efficiency is not so important, consider color values from this second angle. Consider them from this angle anyway—they offer chances for interesting experimentation. One engineer experimented with vivid yellow on his walls, and found it made an excellent color for ladders, scaffolding, and high dangerous runways. He still likes it on the walls also.

The General Electric Company works color value from both ends. White walls to reflect light, black walls to absorb it. In the test sections where high voltage sparks and manufactured lighting are studied, the black walls absorb all unnecessary light and are the perfect background.

Camouflage was an interesting war-time science. Industry reverses it. The General Electric Company paints its

(*Continued on page* 82)

Why not Pull Together for Quality?

With Apologies to "Quality Motors"

You Can't Pull When You're Kicking—

PRECISION machinery, adequate plant, good raw materials, ample inspection—all these make for quality. BUT, there must be behind them the desire of every employee to produce quality.

By W. A. BLACK

Chief Engineer, Indianapolis Plant, Fairbanks, Morse & Company

QUALITY of product is not a thing of which you as plant manager have merely to say, "Let there be quality, and there is quality." There is a lot more to it than that.

We are naturally proud of the quality we have been able to obtain in our product, and perhaps no small part of our pride comes from the fact that it has been brought about through long hours of careful planning and many more of patient execution.

It is trite to say that nothing that is worth while comes easily, but it certainly applies to the attainment of quality production standards.

At the outset let me say that we have attacked the problem chiefly with two major weapons—a monthly publication which we call "Quality Motors," and weekly meetings of executives plus monthly meetings of foremen.

At these meetings quality is the main subject for discussion. And prizes are given for acceptable suggestions and winning slogans. But always quality is the main subject.

Thoroughly boiled down, the whole thing comes to this: selling to factory workers the desire to produce quality.

This organized activity of ours dates from 1927, when W. C. Heath, vice-president in charge of all Fairbanks Morse plants suggested that we form an employee organization of some sort in order to stimulate interest in producing a quality product.

Following this suggestion a quality club was organized here at our Indianapolis plant, or should I say clubs, for there are really two, or two branches of the same one. First there is the group made up as follows:

Works Manager, Assistant Works Manager, Assistant Chief Engineer, Works Superintendent, Chief Inspector, Time Study, Methods and Equipment, Process Engineer, Tools and Machinery, Chief Engineer.

This group meets every week and is presided over by the Chief Engineer. The Chief Inspector acts as secretary.

The other branch of the club, in addition to the above individuals, includes all of the foremen and certain key workmen from the different departments. This group meets once a month after working hours.

It requires no college course in psychology to appreciate the fact that all of us are in better spirits and all work together much better if well fed. So an excellent dinner, furnished by the company, is not the least of the features of these meetings.

The meal over, we settle down to the real business which is quality of product and ways and means of achieving it. Each person present is given an opportunity to recommend changes in design, processes or equipment which will produce better quality. In certain cases of trouble the men working on the parts in question are invited to the meeting and their recommendations solicited.

And this brings up a point which requires mention even if all else is left out of the article for it is one of the chief reasons, I believe, for the success of our quality club. I refer to the fact that in all quality club meetings, both

—And You Can't Kick When You're Pulling!

weekly and monthly, we lay stress on future actions and do not find fault with past performance.

In other words it is our purpose to determine means to improve quality or to prevent recurrence of troubles rather than to find fault with what has been. We never permit any person or department to be criticized for anything that has been done, but give our entire attention to better methods for future performance. The point is that this has the effect of making everyone feel free to make suggestions.

The main idea back of our quality campaign is to advertise to every man in the shop the advantages both to him and the company of producing a quality product. Naturally when we learn of important orders which are received primarily because the customer was impressed with our quality, we take occasion to make good use of this information in our discussions.

We try, without preaching, to show the workmen that this particular order—and probably many others that we do not hear about in detail—would not have been received had it not been for the quality of the product. And if the order had gone elsewhere each workman would have lost the revenue he receives from his work on these particular machines.

And it is in the spirit of advertising quality to our men that the quality club carries on another activity. It gets out a monthly publication called "Quality Motors," to which I have already referred, for circulation among ourselves. This publication is edited by our Chief Inspector.

It is our aim to put into this publication material which will impress the reader with the advantages of quality. We try to do this not with long, "heavy" articles, but rather with short, easy-to-read items where the point is arrived at in a very few words.

As an example of what I mean, one issue of this publication which I have before me contains 15 items in three of its four pages, and each page only 8½ by 11 inches.

And there is another way in which we advertise quality to our men. It is by means of rewards for acceptable quality suggestions on design and manufacturing of our product. In addition there are rewards offered for the best quality slogan submitted each month.

We see no difference between selling soap by advertising and selling the desire to produce quality by the same means. If it will work in one case it will in the other was our contention, and we have proved the validity of our belief. By keeping everybody thinking quality we have induced them to produce quality.

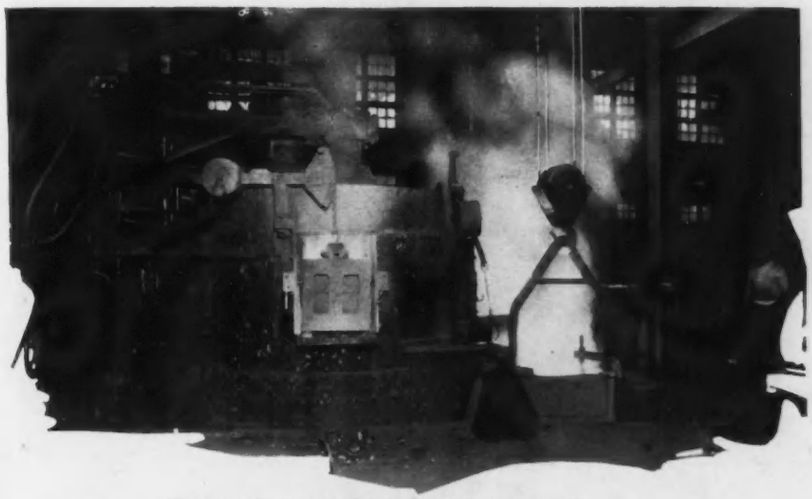
Our records show that complaints relative to carelessness have been reduced materially. This shows that our quality efforts have produced results.

But casting all these advantages aside, if no other results had been accomplished the effect on the ten men making up the executive end of the Quality Club has been worth many times the expense. The club furnishes a common meeting place where engineering and shop problems can be discussed on a friendly basis.

And cooperation between shop and engineering department has been improved beyond belief.

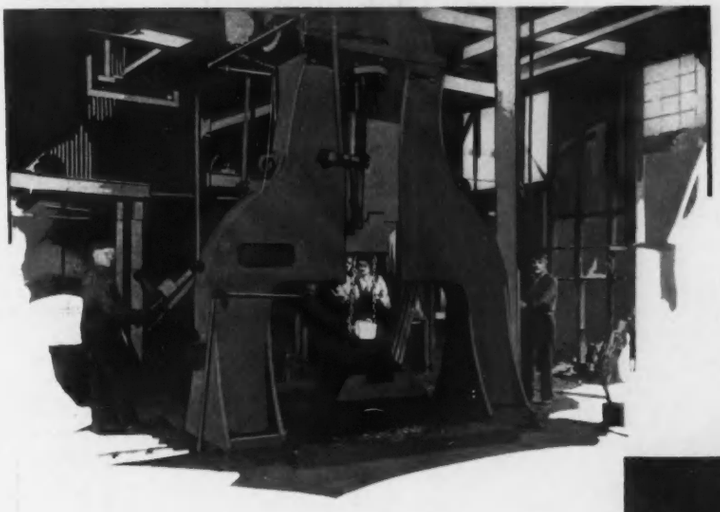
All of us work together much better if we are well fed. Hence a dinner before each meeting

The Production of Heat Resistance Metals



Illustrations by Courtesy of Driver-Harris Company, Harrison, N. J.

Electrical resistance alloys in the form of wire, rod and strip find extensive use in such applications as those requiring an alloy to withstand high degrees of temperature necessary for the successful operation of electric furnaces, ovens, heaters, ranges, and household appliances



One of the largest organizations in the world devoted entirely to the manufacture of heat resisting alloys is the Driver-Harris Company, of Harrison, N. J. This company was incorporated more than thirty years ago and manufactures a heat resistor material known to industry in general as "Nichrome IV." It is produced in the form of wire, rod, strip and castings for any application requiring the use of very high degrees of temperature

In the melting of the different metals entering into the making of heat resisting alloys two-ton Heroult furnaces are used, such as that shown at the top of the page. From the furnace the molten metal is poured into molds forming ingots, much in the manner shown in the illustration at the upper right, which shows a section of the foundry where the molds are poured

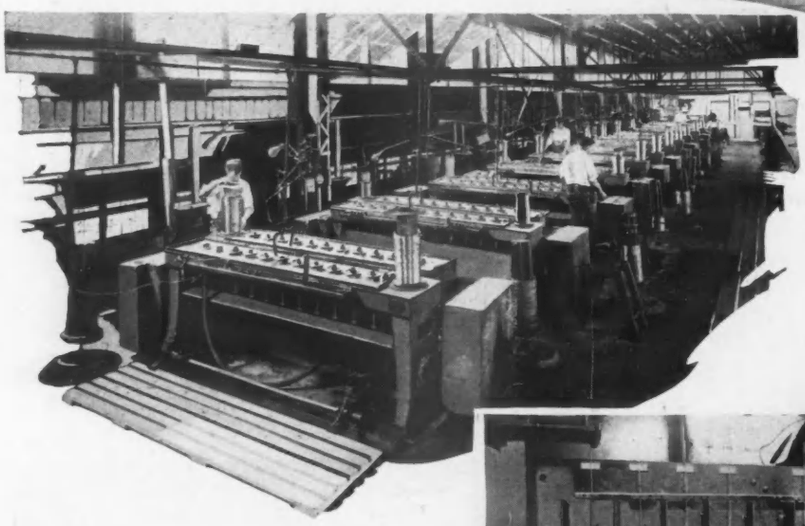
Once the heat resisting alloy ingots have been cast in the foundry they pass into another department of the shop where they go through a refining process. This operation consists of milling and hammering under such gigantic steam hammers as that above. From the Hammer Shop the material goes to the Hot Mill, shown at the right, where it is drawn into rods

Extreme care and the use of the most modern facilities are necessary in the drawing of heat resisting wire. In the Heavy Wire Department, shown below, the material is single holed and then drawn through steel plates, after which it is passed along to the Fine Wire Department for further drawing and refining operations

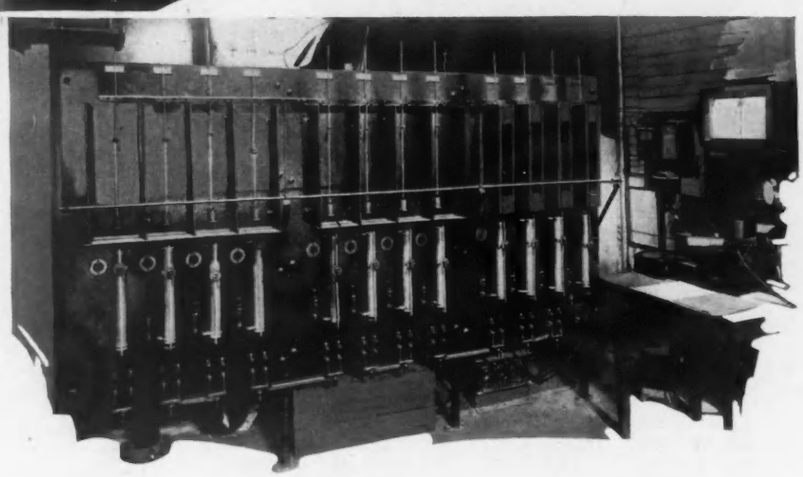
It should be understood that "Nichrome IV" is manufactured in the form of wire, strips and castings and that in the production of these different forms other operations than those described are necessary. In any event the alloys pass through about the same sequence of manufacture except in the making of castings, which is a simple foundry process

After the alloy ingots have been drawn into rods in the Hot Mill they are thoroughly cleaned and are then annealed in large furnaces in that department of the plant shown in the illustration directly above

In the Heavy Wire Department shown at the right the "Nichrome IV" rods are drawn as small as 0.040 inches in diameter, after which they pass into the fine wire department where they are drawn to finer sizes

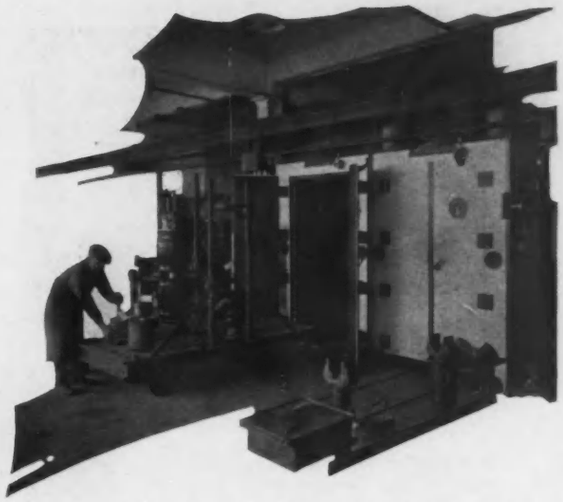


Different applications of heating elements require various forms of resistors. These may be in the form of wire or strip such as those incorporated in such familiar devices as electric irons, toasters, percolators and many other household appliances. In industry, the principal applications are in such devices as furnaces and ovens or other large heating units of similar nature



Absolute control over every material and every operation entering into the making of heat resisting alloys is essential for the production of uniform and quality products. For this reason, and before the resistor materials are shipped, they are given thorough life tests on the apparatus shown at the right. This life test is just one of the close technical controls under which heat resisting materials are manufactured at this plant

Applications of Electric Ovens



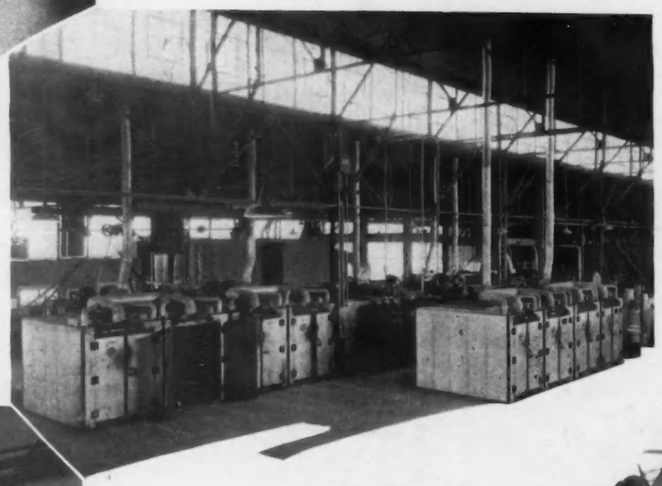
Illustrations by Courtesy of Gehnrich Oven Company, Long Island City, N. Y.

In every electrical manufacturing plant there are so many opportunities for the advantageous application of electric heat that it is now coming into common use. According to the 1927 Census of Manufacturers, electric furnaces valued at $2,471,196 were manufactured in 1927. There were also manufactured in that year 2634 industrial electric ovens with the necessary heating equipment for such ovens, and these had a value of $746,645. Indicating that while electric heat has its advantages in industry it also offers a large potential market to the makers of such equipment

Electric heat possesses many desirable qualities for industrial manufacturing processes; the value of which and their effect upon the overall unit cost of the finished product are rapidly becoming generally recognized. Its use permits of a degree of temperature control that is practically unattainable with other heat generated by means of combustion methods. And it is this control, low cost, cleanliness and other features that make its use profitable in electrical manufacturing

The outstanding characteristic that makes electric heat well suited for many miscellaneous industrial applications is its total absence from flame or combustion. It is clean, free from soot, as well as fumes and obnoxious odors, while the fire hazard is practically eliminated. Some industrial applications of electric furnaces and ovens are shown above. That at the upper left is used for baking abrasive wheels. At the upper right are two ovens for drying armatures. In the center is a battery of ovens for drying enamels and paints, while that at the left is used for drying sand cores

ELECTRIC heat is definite and a predetermined cycle of operations consuming the minimum time to accomplish the desired results can be adhered to day after day. In addition its use improves the quality of product and at the same time maintains uniformity in production. In the making of many commodities even distribution of temperature within the working chamber of the oven is a common requisite of many installations. It can easily be obtained with electric heat, as there are no hot spots or cold zones which makes it possible to utilize the entire working area of the oven to maximum capacity



Many industries today are dependent in large measure upon heating processes in one form or another. As an example the illustration above shows two ovens as they are employed for baking a lime coating on wire, which serves as a lubricant prior to the drawing operation in wire manufacture

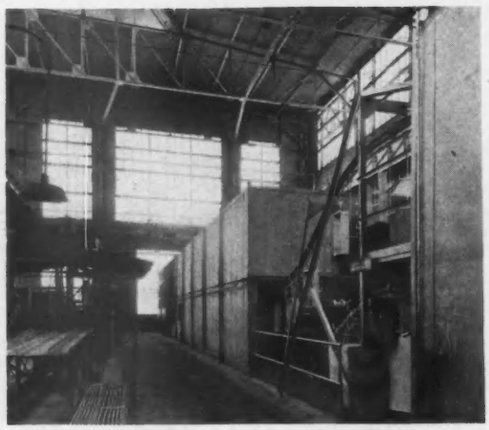
In heating products in which there are volatile solvents electrically heated ovens offer an unusual degree of safety in that there are no flames to come into direct contact with the work

One such installation as that mentioned is shown in the illustration directly above. This is a battery of fifteen box-type ovens for baking many volatile and vulcanized rubber products

The electrical and manufacturing industries are extensive users of electric heat and electric ovens in many forms, one of which is shown in the illustration above. Here is a battery of three box-type ovens as they are used for annealing and similar heat treating

Electrically heated ovens may be had in many different types and for a wide range of uses. They are also made so that any reasonable degree of heat can be had and its control does not require the employment of highly skilled labor

Electric ovens are also employed in the production of refrigerator cabinets and the equipment is usually very similar to that shown at the right. This consists of a single strand conveyor oven with separate upper and lower chambers for finishing processes on cabinets



Aside from baking and drying operations, electric ovens are also frequently used in many heat treating and annealing processes, such as that shown in the illustration above. It is an oven that is used for continuous annealing operations on metal products

Manufacturers' Opinions About

Accounting Control Over Distribution Costs

Among electrical manufacturers there is a wide divergence of opinion as to the degree of control over cost accounting for distribution

THE margin between the sales price and the cost of manufacture has frequently been the subject of criticism. This criticism arises from the assumption that costs in the marketing operations are too high. Those who undertake to analyze this statement are immediately confronted with the necessity for defining the phrase "too high." How can it be known definitely that a cost is too high unless there be a basis of cost that is not too high, in short, a basis that may be accepted as standard? A second question naturally follows. How can such a standard be set up unless there be definite specifications on which it is predicated?

The technique of cost accounting for distribution seems not to have reached that state of development that cost accounting for manufacture has reached. For this reason, possibly, knowledge of distribution costs is not as adequate as knowledge of costs of manufacture.

Realizing that these conditions were general and in order that more definite knowledge might be had on the subject the Department of Manufacture, of the United States Chamber of Commerce, instituted an inquiry concerning cost accounting for distribution accounting by the manufacturer. The results of this inquiry, as it was conducted to secure definite information on the subject from individual manufacturers, relative to the degree of accounting control over distribution costs are abstracted in the following.

Information Was Obtained by Questionnaires

The inquiry referred to was addressed to executive officers of large manufacturing companies in various lines of industry. The questions asked were not technical in character. They were designed, first, to secure the point of view of the executive on the degree of control over distribution costs that the executive feels he possesses; second, the adverse effect, if any, on the competitive situation due to a lack of control over distribution costs; and third, the opinion of the executive as to the feasibility of the development of uniform principles of distribution cost accounting.

To obtain the desired information the following letter of inquiry was addressed to leading manufacturers:

"Frequent representation is made that many of the competitive difficulties that confront manufacturers are caused by a lack of knowledge of total costs. It is our impression that manufacturers generally have adopted quite accurate methods for the determination of manufacturing costs, but thus far they have not been as successful in the field of distribution cost accounting.

The Three Questions Asked

"We wish to make an appraisal of the situation and learn whether it is general, and in addition as to whether steps can be taken to correct it. Accordingly, we would like to get your views and those of a small number of other industrial executives. The following questions suggest themselves:

"1—Do you consider that you now have as reliable accounting control over your distribution costs as you do over your manufacturing costs?

"2—Do you consider that price competition in your industry is affected by the lack of sound knowledge of distribution costs as they relate to individual products?

"A third question of more technical character is also suggested and on it we would like your views or those of your assistant who is directly concerned with accounting methods:

"3—Do you believe that it is practical to develop for general application an accounting procedure for the costs of distribution that will result in their better control and in their effective use in the determination of selling prices and of selling methods?"

The following summary presents the different points of view of fifty leading manufacturing executives in various lines of industry:

Question 1—Accounting Control Over Distribution Costs

The Question—Do you consider that you now have as reliable accounting control over your distribution costs as you do over your manufacturing costs?

The answers of the fifty executives have been summarized as follows:

Affirmative answers.....29—58%
Negative answers.....21—42%

It will be recognized at once that there is no great preponderance of opinion. Possibly this situation might have been expected, for no definition of the expression "accounting control" is provided.

In general, accounting control over distribution costs may be directed toward two different ends. Accounting control may come first through a budgetary system which enables the executive to watch his distribution expenditures and take steps to curtail those expenditures which exceed the budget.

Accounting control may have an entirely different objective, namely, the control over selling prices of individual products so that there may be a satisfactory margin of profit on each product.

It is entirely probable that the several executives answered this question in the light of their own view of the character of accounting control that they desire. One executive, for example, says that he feels that his company has a "very reliable accounting budget and forecast of distribution costs." On the other hand, some executives were thinking of their control over product costs, for as one executive stated: "Any analysis of distribution costs by commodities must necessarily in many instances be upon an arbitrary basis, as such expenses of distribution are not directly related to the individual commodities. Such an expense is salesmen's compensation, which frequently cannot be allocated to individual products."

The Effect of Price Competition

The question was intentionally stated as it appears, for it was the desire to secure the observations of executives on the broad question in their own words and according to their own concept of accounting control. It is believed that the study of the individual answers will be profitable.

Those who explain that they do not have as reliable control over distribution costs as over manufacturing costs assign various reasons for their failure in this regard. One executive puts it tersely, that "owing to the very nature of the costs of distribution—dependent on so many factors which cannot be forecasted accurately—the control is not satisfactory, or as accurate as it should be." Another says that although they have "a very excellent system for the control of manufacturing costs of individual commodities up to the shipping room door, the corresponding distribution costs are not at all satisfactory and we do not know how to make them so."

Question 2—Effect on Price Competition

The Question—Do you consider that price competition in your industry is affected by the lack of sound knowledge of distribution costs as they relate to individual products?

Answers from forty-five executives were received to this question. A summary of their answers is as follows:

Affirmative answers.....30—67%
Negative answers.....15—33%

It is of interest to analyze the answers of those who took the affirmative side in terms of the answers of the same executives to Question 1. The results are:

Affirmative answers as above..... 30
Of these, those who state that their own companies have effective control over distribution costs... 13
Those whose companies do not have satisfactory accounting control over distribution costs..... 17

Turn now to the case of those executives who answered Question 2 in the negative, that is, to the group that considers that the lack of knowledge of distribution costs has nothing to do with price competition:

Negative answers as above..... 15
Of these, those who state that their own companies have effective control over distribution costs... 13
Those whose companies do not have satisfactory control over distribution costs..... 2

It is, of course, difficult from these figures to point out any especial trend in the thought of these executives. The situation, however, is indicative of one thing, that there has not been the concentration of thought on the problems of distribution costs that there has been on the costs of production. Whether or not this is due to the feeling that manufacturing costs are the more important, or as, one executive expresses it, that competition in the past has been more affected by the lack of manufacturing costs than by the lack of distribution costs, is not evident.

Question 3—Uniform Distribution Cost Accounting Procedure

The Question—Do you believe that it is practical to develop for general application an accounting procedure for the costs of distribution that will result in their better control and in their effective use in the determination of selling prices and of selling methods?

Answers from thirty-three of the executives are summarized as follows:

Affirmative answers.....24
Negative answers..... 9

Turning first to the reasons of those who have the negative view, one executive aptly expresses the difficulty as follows: "It is extremely difficult to determine an equitable basis for the distribution of selling expense to individual products where the salesmen sell the entire line."

The point of view of those who answered the question in the affirmative is well expressed in one answer, as follows: "It should be possible to develop broad, general principles of accounting procedure relating to costs of distribution and the larger industries might well take up the problem through their respective trade associations."

In answer to Question 1, "Do you consider that you now have as reliable accounting control over your distribution costs as you do over your manufacturing costs?" Those executives having to do with Anti-Friction Bearings answered "Yes."

Those executives concerned with Asbestos Products stated, in part, "We do feel that we have a reliable accounting control of distribution costs, but our difficulty, as with many other industries manufacturing and merchandising a variety of products, is the allocation of distribution costs to individual commodities. Any analyses we might get of distribution costs by commodities must necessarily, in many respects, be upon an arbitrary basis, as such expenses of distribution are not directly related to the individual commodities.

Wire and Cable Manufacturers' Replies

"Some expenses of distribution, such as salesmen's compensation can be allocated to the individual commodities. Some of the other expenses can be allocated to particular groups of commodities. Then, there are other expenses, such as the general administrative expenses, which have no direct relation, even to the commodity groups.

"As stated above, we feel that the accounting control we have is reliable. It determines our cost of distribution and we are satisfied with the analysis up to the point that it becomes necessary to arbitrarily pro-rate such charges. We prefer to compare the results obtained through this expenditure, rather than pro-rate the charge against portions of such result."

Electrical Wire and Cable manufacturers answered that having for some years had plants located in New Jersey, Pennsylvania, Missouri and California they had considered the larger element of distribution cost, namely, transportation of raw material to plants and finished products to customers, but the many other detailed elements of distribution costs, such as containers, packing, handling, etc., are now and have for some time past been given careful study so as to secure accounting control of distribution costs in as reliable a way as that of manufacturing cost.

Those interested in Machinery were of the opinion that it is very much more difficult to keep selling and distribution

costs within the budget allowance than it is manufacturing costs, and that is due largely to the fact that conditions may vary during the year, and, on that account, it is necessary to make departures from the budget, while executives dealing in Machine Tools said that they did not consider that they had as reliable accounting control over distribution costs as over manufacturing costs.

In reply to Question 2, which asked: "Do you consider that price competition in your industry is affected by the lack of sound knowledge of distribution costs as they relate to individual products?" those concerned with Anti-Friction Bearings replied in the affirmative.

Manufacturers of Asbestos Products replied, "We do not consider that price competition in this industry is affected by any lack of knowledge of distribution costs. Our reason for this statement is due primarily to the fact that the distribution costs of individual products does not vary as much with individual products as it does with the size of sale, or the condition under which such sale is made.

"In the majority of products of this industry the selling price does not vary in direct proportion to the volume of sale, and the cost of distribution per unit will vary to a greater extent with volume of sales than with type of products. The expense of recording actual costs of distribution would be prohibitive and would give nothing but a historical record, which could be anticipated with any given size order, under definite selling conditions."

Distribution Costs Vary with Volume

Manufacturers of Electrical Wire and Cable stated, "Yes, at least in part," while Machinery and Machine Tool makers thought that price competition in the industry is seriously affected by the lack of sound knowledge of distribution costs. Costs vary with volume, and manufacturers are prompted to cut prices in order to add to volume in the hope that at least a substantial part of the overhead will be carried, even if the price is below cost.

On the other hand, radio manufacturers thought that they were not in position to answer the second question with any degree of absolute knowledge, but believed that if the distribution costs were not taken into consideration when figuring selling prices—or in other words, if the entire cost of the job is not thoroughly known—the producer must eventually suffer some embarrassment.

Question 3—"Do you believe that it is practical to develop for general application an accounting procedure for the costs of distribution that will result in their better control and in their effective use in the determination of selling prices and of selling methods?" brought the following reply from manufacturers of Asbestos Products:

"We feel that the accounting procedure required in this industry should deal with cost of distribution by individual units only insofar as such costs will vary directly with such accomplishment. The best control of indirect costs of distribution will be obtained through the analysis of such costs in total, rather than the arbitrary pro-ration of such items to the individual units. The use of distribution costs in determining selling prices cannot be done through the accounting procedure, but only through statistical analysis."

Accounting Problems Deserve Attention

Other replies to the same question indicated that executives in the machinery industry thought that it is practical to develop for general application an accounting procedure that will result in more accurate information, and therefore in better control of cost of distribution, and the determination of proper selling prices. It has been found that a thorough knowledge of the size of the market, which can only be secured by cooperation among the manufacturers themselves, by monthly reports of volume, will prove more effective.

Machine tool makers stated substantially that they did not believe that it would be practical to develop for general application an accounting procedure for costs of distribution that would give anything like accurate determination of the cost.

In the radio industry there is the idea that any standard form of accounting procedure can only apply to like commodities and to try to establish a general principle to govern all commodities would be impractical, due to the variable factors which enter into the costs of the many products that must be considered. There is no doubt, however, that it is absolutely necessary to determine the distribution costs in order to establish equitable selling methods and prices.

What is the net result of this inquiry? Apparently the differences of opinion as indicated by the answers to these three questions are so great as to indicate the necessity for narrowing the discussion on the subject until definite and satisfactory conclusions are reached.

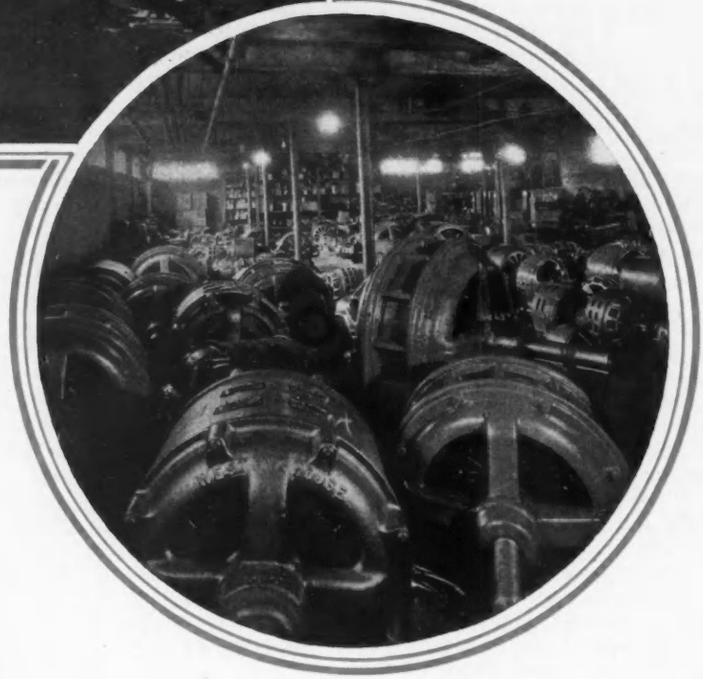
However, in line with the thought expressed by the executive who stated that it should be possible "to develop broad general principles of accounting procedure relating to costs of distribution," it would seem that the most progress would be made if the important lines of industry now active in studying the accounting procedure for production, and in developing uniform procedure in that field, should undertake to set up such broad general principles as referred to through the medium of a committee of skilled accountants for each industry and to secure comment and criticism from the executives and the industrial accountants generally in the industry. In short, the problem appears to be one for the individual industries to attack through their trade associations. Apparently, also, the problem is sufficiently important to justify a place in association activities.

Obsolescence of Equipment Is a Serious Menace, if—

OBSOLESCENCE of equipment is a serious menace, if changes in industry or shifts in trade take manufacturers unawares, or if they neglect the warning signals, the Assistant Secretary of Commerce pointed out in a recent radio talk. If, however, the situation created by a discovery of something better, than the piece of equipment or manufacturing method formerly used is quickly and effectively dealt with and the new and better things are utilized at once, obsolescence may have a favorable aspect, indicating that progress has been made. The progressive factory manager, regardless of apparent waste prefers to have a junk pile outside of his factory instead of inside and in use.

Failure to keep factory equipment up to date by according practical recognition to new processes usually means, Dr. Klein pointed out, inability to compete, a diminution or complete extinction of profits, and a prevailing demoralization in the conduct of the business for which the consumer ultimately must pay them higher prices and a poorer product. The Assistant Secretary, however, asserted his confidence in the ability of American ingenuity and farsightedness to win conclusive victories over this menace of obsolescence.

Advertising Helps



ADVERTISING matter such as the blotter reproduced below is largely responsible for the building up of the motor repair shop shown in the accompanying views illustrating the repair and storage departments of Charles H. Leppert's shop in Hartford, Conn.

SERVICE!
A Portable Electric Tool is only as good as the service behind it.
Any mechanical device will eventually show wear. When this occurs the question of "How quick can I get service?" becomes of major importance.
We maintain a complete service station carrying a stock of parts and manned by factory trained mechanics, thus assuring prompt and efficient service on Black & Decker Electric Tools.
Charles H. Leppert
109 Walnut Street
Hartford, Connecticut

ADVERTISING, in one form or another, is known to have been in use among civilized peoples, practically the world over, ever since the days of the dark ages, that is, if the signs and symbols employed by the ancients can be considered as advertising. Pawnbrokers' signs and the barber poles of today, for instance, are but relics of the advertising media of those early times. Today, however, the medium employed is largely the printed word, and it has come into quite extensive use for all manner of purposes. To the end that the answer to the trite question, "Does it pay to advertise?" is usually in the affirmative.

In some of its many forms advertising, in large measure, is used by practically every business and industry, primarily in the nature of promotional information, intended to enhance that business or industry. This being the case it would seem that every phase of the electrical industry, but more particularly the motor repair branch, would do well to advertise more extensively than is now general practice. From observation it appears that motor repair shops either fail to recognize or at least take advantage of the opportunities afforded by advertising.

Some few shops, of course, do a little advertising in local newspapers serving the territories in which they are located, and in telephone and city directories. This in the main is general in character, not always well prepared and

to Build a Motor Repair Business

More than twenty years ago Charles H. Leppert started a shop in Hartford, Conn., for the repairing of electrical apparatus and due to good will, built upon service, workmanship and constructive advertising, it has continued to grow in size

By WILLIAM W. BAXTER
Associate Editor, ELECTRICAL MANUFACTURING

in most instances does not reach directly those who would be most interested in reading such advertising.

About twenty years ago when Charles H. Leppert set himself up in the motor repair business in Hartford, Conn., he was immediately confronted with the problem of finding customers or patrons for his business. He realized at the time that there were three ways in which this could be done, namely, through personal contacts, telephone calls and advertising.

Realizing as he did that few users of industrial electrical equipment were not overly inclined to listen to lengthy expositions about facilities, quality workmanship and twenty-four hour service, Mr. Leppert set about planning a constructive advertising campaign purposely directed to those industrial executives who would be interested in repair facilities, dependable service and quality workmanship.

THE motor repair shop of Charles H. Leppert occupies the one-story brick building shown in the illustration at the top of the page. Storage and display space for new and repaired apparatus are in the basement of the building

EVERY modern facility for the complete reconditioning of electrical equipment of any type is in use in Charles H. Leppert's motor repair shop. At the left is a view in the coil winding department showing some of the equipment

At first the advertising consisted of the usual insertions in newspapers and various directories, but as his business increased Mr. Leppert prepared and released additional advertising matter, in the way of blotters, letters and cards of different kinds. Each of these was different in some respects, yet most of them stressed the one idea—dependable service for all kinds and types of electrical apparatus, twenty-four hours a day and seven days a week.

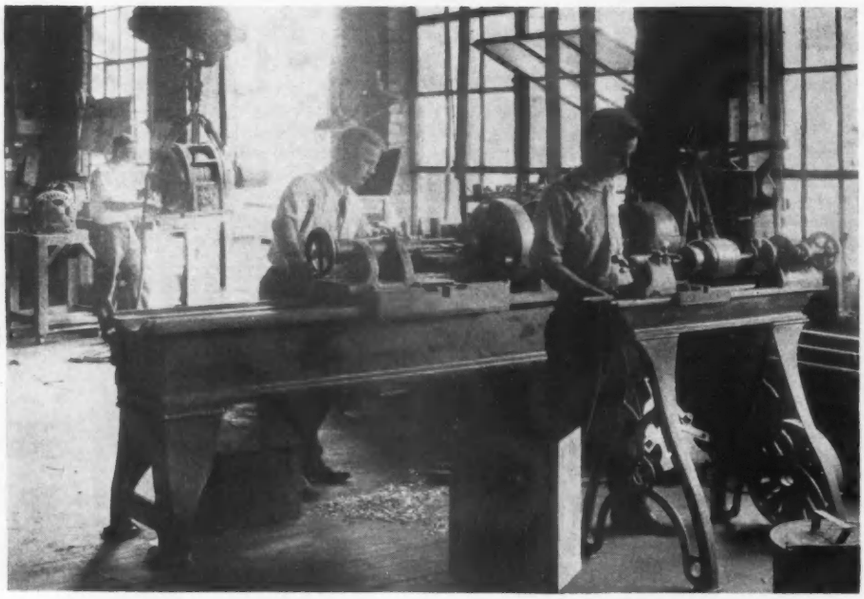
One example of the type of these advertising cards is reproduced with the accompanying illustrations. And, while it emphasizes "Breakdown Service," it also directs attention to the fact that Charles H. Leppert is a dealer in many electrical supplies and kindred mechanical devices. This card was intended as a permanent record to be placed near telephones and to be used at all times in calling for service. To insure that prospective customers could reach some member of Mr. Leppert's organization and through him obtain assistance, three names of employees are listed together with their telephone numbers and street addresses.

Another type of advertising matter employed by Mr. Leppert to direct attention to his repair business is in the form of a conventional blotter, one of which is reproduced with the accompanying illustrations. It, too, directs attention to "dependable service" and at the same time points out that facilities are to be had for the reconditioning or servicing of portable electrical tools.

The result of the circulation of this advertising matter among his customers and

prospective patrons—not discounting good will, built upon service and quality of workmanship—is that Charles H. Leppert has been forced to increase his facilities three different times to accommodate demands for them.

Now located at 100 Walnut Street, in Hartford, Conn., the motor repair shop of Charles H.Leppert serves a wide area of the vast industrial center surrounding Hartford. His shop occupies a one-story brick building with basement and in it are to be found those facilities usually common to the motor repair business. The main floor of the building is employed for office space and for the repair work. In the shop are ample facilities to permit of reconditioning almost any type of electrical equipment. One section is used for all dismantling and assembling operations. In this section, and extending the full length of the building is a bench, numerous small tools, portable stands, racks and tables and other shop equipment necessary for the handling of armatures, windings and frames. These are so located that natural daylight is to be had during working hours, and at the same time are conveniently placed with respect to other sections of the shop.



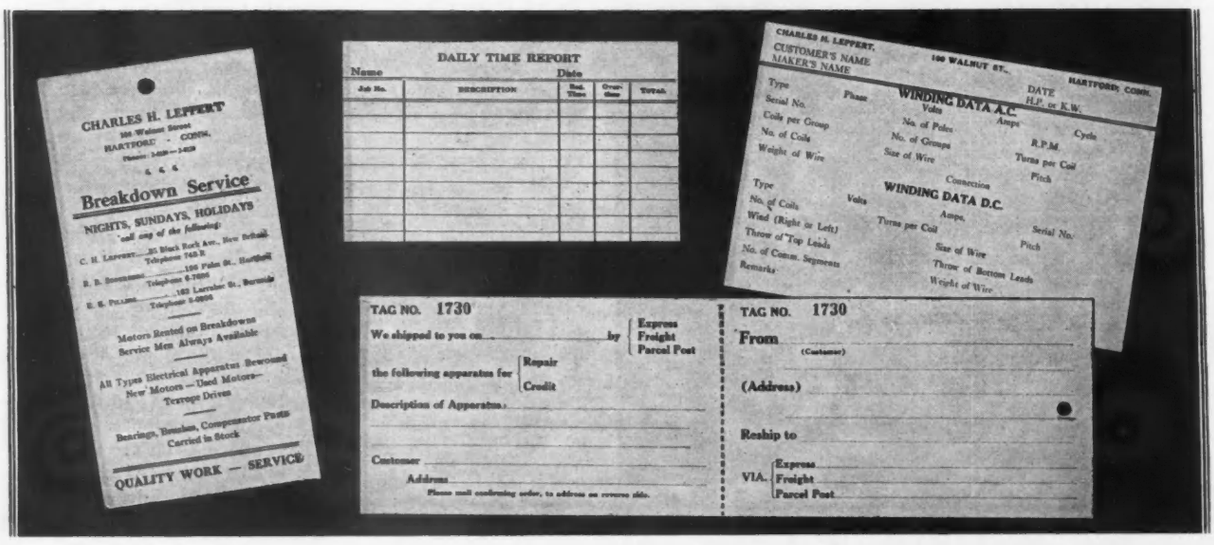
MODERN machine tools and mechanical handling equipment are employed throughout in the motor repair shop. The view above shows but a small section of the shop and part of the receiving and shipping department

Adjacent to this section of the shop is the department in which all coils and windings are either made or repaired. It is equipped with the usual types of winding, taping and spreading machines, in addition to provisions for the storing of such wire as is used in coils. Adjoining the coil department is the stock room where all materials necessary to the business are kept, except manufactured parts, such as bearings, brushes and the like. These are stored in bins and racks in the basement of the building together with new and reconditioned motors, generators, control apparatus and other electrical equipment.

Still another section of the main floor of the building is employed for all machine work. This section is equipped with the usual lathes, drills, presses and other mechanical apparatus needed in repairing motors. Other facilities include the typical dipping tank and baking oven employed in the impregnation and drying of coils and windings. It might be added that overhead monorail hoists are used for handling work and materials in the shop.

Illustrations accompanying this article show in general the arrangement of the equipment in this repair shop and others show some of the records used in the conduct of the business, which is strictly that of reconditioning electrical equipment, as no contracting is done, and the success of his business Mr. Leppert attributes first to service, second to quality workmanship, and third to the fact that his customers and prospects are being continually advised through advertising what Mr. Leppert has to offer in times of need.

THE usual records, such as those shown below are employed in the accounting for labor and materials used on the various jobs. The form at the left is one of the typical advertising cards directing attention to dependable service



As the Editor Sees It

Stanley A. Dennis

EDITOR, ELECTRICAL MANUFACTURING

Let's Demonstrate Our Confidence Now

MONTHS ago President Hoover declared that action is the cure for economic troubles such as that which descended on the country following the stock market crash in November. If the President's suggestion was pertinent then, it is certainly much more to the point today. Thanks to his efforts and achievement in the face of an impending panic, an achievement the like of which no other president has to his credit, business is far better than it would have been otherwise, despite the fact that it certainly is not yet what it should be. And the speed with which business is restored to satisfactory levels depends in large measure on the willingness of business leaders to demonstrate their confidence under existing conditions.

While it is true the business is steadily growing better, it is equally true that the rate of improvement is altogether too slow. And this slowness seems due to an unjustifiable hesitancy on the part of business leaders themselves. Officials of the Federal Reserve System have recently pointed out that both money and credit are available in ample quantities to business leaders who desire to use them. And the terms governing their use are not difficult to meet. If the financial world, traditionally conservative and tight-fisted, is willing to be generous, why should business hesitate to go ahead? It may be that business itself is not satisfied with certain policies or methods of operation in the banking world in general and in the Federal Reserve System in particular. If so, then let business say so. Certainly, adjustments satisfactory to business as well as to the banks can be made, and should be made without delay.

At any rate, maintenance of consumer buying power is the need of the hour. Such power is maintained by the keeping up of employment and wages. These in turn are maintained by executive decision to go ahead with regular production and distribution. And if sales and therefore production are lower than one might wish, there are other means to keep in mind. Rather than lay off men, and thus increase the number of unemployed, it is better to retain the entire force on a part time basis, or to vary the number and size of working shifts. And in practically all lines of manufacturing, the present is an almost ideal time to make improvements, to build additions, to modernize the plant in every possible way. Activities of this kind will continue to provide work and will prepare the business for the upward swing in spring and early summer and for the big volume expected in the late summer and autumn.

Why Not Fill It Out at Once

MANUFACTURING executives who breathed a sigh of relief with the mailing of their income tax returns to Uncle Sam are not yet "out of the woods." There remains the return to be filled out for the Census of Manufactures. While this return does not yield any revenue to the government it is nevertheless an exceedingly important document, not only to the government but to business itself. Statistical information derived from this census is invaluable to the plans of countless business concerns during the interval between the taking of these figures on manufacturing. The completion of the census and the release of figures derived therefrom is dependent very largely on the promptness with which manufacturing concerns fill in and return their blanks. Certainly business should find it easier to think about golf and vacations and should enjoy an easier conscience, if the return is filled out at once.

Play Fair with Dealers

IF any electrical manufacturing concern is considering the adoption of what are commonly called Ford policies and Ford methods, it might be wise to make haste slowly. For years Mr. Ford has domineered his dealers. He has insisted on thinking of them as a part of his factory organization, never as independent business concerns. He has cut prices as he desired; thrown the burden of carrying the reductions onto his dealers; set margins that yield an almost invisible net profit; set quotas as he desired; disregarded dealer wishes on a score of points; and by high-handed supervision and a violation report system disciplined his dealer agents to the point of rebellion. It is true that Ford dealers have made money, but they have done so despite the rigorous Ford policies and methods and not because of them. Now that Ford is facing what is real and likely to be lasting competition, the long-suffering dealer need suffer no longer. It is not surprising, therefore, to learn in the news of the hour, that Ford dealers in large numbers are giving up their agencies, and are making new deals with Mr. Ford's competitors. Once more it becomes evident that the only business policy that endures is the one that continues to play fair with all the parties in a transaction.

Contacting the Building Industry

ON good authority it is said that seven or eight out of every ten houses are erected by the speculative or investment builder. If this be true, and presumably it is, then there is every reason for closer contact between the electrical manufacturer and the building industry. This contact has never been what it should have been. Contact with those employed by the builder to erect and equip his houses, such as the electrical contractor-dealer and others, has been well maintained through the years. But a far better contact is possible between the electrical industry and those executives within the builder's office who make decisions that govern the work of those concerns employed by the builder under separate contract. Architect, specification writer, and engineer, all need a better understanding of electrical service at its best. They need to know what kinds of electrical service are possible, what the necessary equipment costs, how it can be obtained and where, and what are the accepted standards of electrical installation today. In other words, it comes down to this: that the electrical manufacturer must carry his story not only to the contractor-dealer but to the building industry as well. The manufacturer has a great story to tell. It must be told; and it must be told in a way that each kind of listener understands.

Ready to Apply

Twelve liftable ideas for cutting costs or simplifying the day's work of the electrical manufacturer

Points Worth Learning About Lacquer Application

MOST lacquers, such as are used in finishing many electrical products, present some hazards, but they are not at all serious if certain simple precautions are taken in their use, E. H. Bucy of the Waukegan Chemical Company told a recent safety council gathering.

"There should be sufficient air current passing throughout the building," says Mr. Busy, "to keep the concentration down to a minimum. This may best be done by having the air drawn into the building through fans or ducts and then having a positive discharge through other fans. Particular care must be taken in lacquer manufacturing plants that the air near the floor is moved, as many lacquer solvent vapors tend to sink rather than to rise.

"Floors should be of wood block or other approved type rather than cement, as there is the possibility of steel nails in the heels of workmen's shoes causing sparks by contact with the cement floor."

A Fast-Working Electric Gage

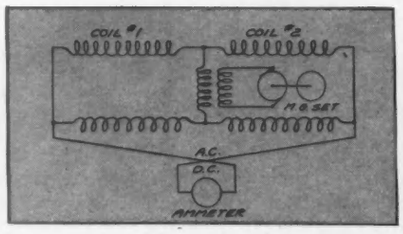
AN electric gage has been developed in the general engineering laboratory of the General Electric Company to meet the demands for an accurate gaging device that has but a minimum of moving parts and that will permit routine gaging operations to be conducted with great rapidity.

This type of gage was originally designed for measuring the bore of a hole, but by slight changes of the gaging head it can be used for external measurements. During a period of three months 59,000 such holes were tested, yet very little wear could be detected and the electric gage held its calibration.

In the view shown below this gage is set up in production work. The ammeter, which is the lower instrument in the illustration, deflects full scale for a variation in diameter of 0.0005 inches. One ten-thousandth of an inch will give the ammeter needle a scale deflection of one inch. The piece in the operator's hand is rotated once for diameter inspection and the ammeter needle meanwhile observed.

The electric gage operates entirely independent of the sense of human touch which is so essential in the use of "go" and "no go" plug gages. As is evident from the diagrams the gage functions on changing the reluctance of a balanced, differential, alternating-current circuit which in turn operates a direct-current ammeter through a small rectifier.

A.V.M.



The Gage and How It Works

This speedy gage may be used for measuring internal and external dimensions. It is accurate to within 0.0005 *inches and operates entirely by means of electrical circuits controlling an ammeter*

Keeping Fire Prevention Devices on the Job

A PRECAUTION the maintenance department of one electrical manufacturing concern takes involves the fire hazard. Before a painting gang goes to work on an interior painting job, it covers all the sprinkler heads with paper bags.

These keep the heads clear of paint drippings which might clog the sprinkler mechanism and yet they do not interfere with its operation should a fire occur before they are removed. G. H. T.

Shutdowns Eliminated by Survey of Brush Requirements

THE recent experience of an Illinois manufacturing concern illustrates the importance of a careful survey of the brush requirements in many an electrical manufacturing plant. This plant was operating 122 motors and several generators, both alternating and direct current. On some of these machines two sizes of brushes were used. No record had been kept of the brush requirements for the individual machines, and no method established for ordering brushes until the need made itself apparent. The delay resulting while these brushes were being made up resulted in frequent shutdowns, which condition was often aggravated by the wrong size of brush being supplied, especially on those machines using two sizes.

A survey was made of the brush requirements for the entire electrical equipment of the plant. Non-essential variations in grade, dimensions, bevels, style of shunt connection and other details were eliminated, making it possible to take care of the entire equipment with forty-five styles instead of over 100 previously required. These styles were tabulated showing the machines on which each style was used and a definite order point set up for each brush. This plan made it possible to insure a sufficient supply of brushes being on hand for any emergency without making the inventory unduly heavy.

The plan has been in operation for six months and, while this period is too short to permit an estimate of the money saved by means of this survey, the improvement in machine operation and the elimination of shutdowns due to lack of brushes, has fully justified the adoption of this plan.

From the point of view of the manufacturer of motor-driven products, there is the inescapable conclusion that the more nearly standard the motor brushes are the less the likelihood of long time-out periods for repairs. Hence the less the reputation of the machine itself suffers. N. C. C.

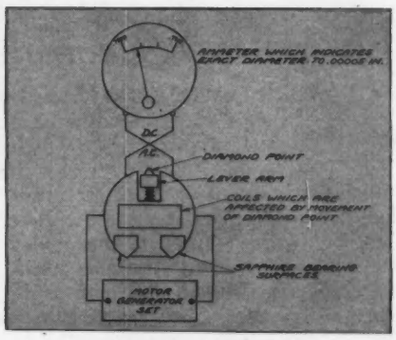
$2,458 Saved in One Year

THIS saving is what the Benjamin Electric Manufacturing Company makes by the intelligent use of lift trucks.

Supplies come by motor truck to the receiving platform. The driver and one other man pile the boxes from the truck to a lift truck platform. Fifteen standard stock boxes, weighing up to 2,000 pounds, is a regular load.

Another man with a lift truck hauls the boxes to the receiving clerk who checks them against the order. From the checker, the material is hauled to the proper part of the storeroom.

Material on the third floor is handled to the assembly floors by the stock-room



men, but for the fourth floor the stockroom men deliver a platform to the elevator man, and he in turn delivers it to the receiving clerk on the proper floor. When the material arrives on the assembly floor, the receiving clerk hauls the platforms to the particular girl who is to assemble the device.

The assembled units are put into standard stock boxes, piled on platforms, and then trucked by the floor man to the inspector and packers. When packed, the shipping boxes are delivered to the elevator man.

At present, 15 stock boxes to a load are handled, but with push trucks only 6 boxes could be handled. The saving made possible by the use of these trucks amounts to $2,458.40 in a year. J. J. B.

Draining and Drying

NEWLY plated parts at The Hoover Company used to be dipped in hot water and hung on a rack to dry. Now they are dipped in cold water and suspended from a "merry-go-round" inside a radiator-heated "oven." There is a saving in the hot-water cost, and it is easier to drain off the drippings. The plating-department foreman suggested the change. J. J. B.

Making a Normal Allowance for Overhead

WE hear much these days about "normal costs"—that is, costs in which there is a normal allowance for overhead. The purpose is to iron out the irregularities in costs that are due to seasonal and other temporary fluctuations in business.

Before this conception was accepted, an executive might say: "Our costs are high because of the lack of orders." Or another might say: "Our costs are low because of our big volume."

How this policy of establishing normal costs has been put into effect in one large company in Illinois, as described by one of its executives, is as follows: "Last year we opened our account for subnormal production and credited it with $400,000. We have no intention whatever of closing out this amount, feeling that it will be depleted in times of depression to some extent, and our idea is that this fund should be built up to be equal to about two and a half times our annual overhead. This would take care of the unabsorbed overhead on a 50 per cent production over a period of five years, which we think should put us in a very safe position." T.W.H.

For Simplified Skids

AT a recent meeting of the standing committee on the simplification of skid platforms in the Commercial Standardization Group of the Bureau of Standards, it was unanimously decided to revise the Simplified Practice Recommendation as originally adopted and to submit to the industry for its signed acceptance the following uniform dimensions.

It is recommended that the clearance from bottom of runners or other supports to under-side of skid platforms be either 8 or 12 in.; and between inside of runners or other supports be 29 in.

It Isn't Just to Look At

The switches switch and the busses rotate at the will of the prospect to whom this selling model is being shown

It is also recommended that overall dimensions for skid platforms used for shipping goods be either 33 in. wide by 54 in. long, or 42 in. wide by 66 in. long.

Panic Proof

STOCK rooms need fencing off in some manner from the general run of employes in a manufacturing plant. This goes without saying. But the trouble often is that these stock rooms are frequently so located that to partition them off adequately means the cutting off of exit passages not needed from day to day, but urgently required in case of fire.

One electrical manufacturer meets both these needs by inclosing his stock rooms with partitions made of very thin wooden slats fairly widely spaced. These slats make possible an enclosure, the precincts of which are never violated in the ordinary course of the day's work, but which yield to very little pressure in case emergency exit is demanded. A. C. H.

Seeing Around a Corner

A LIVE roll conveyor goes down the length of a long room in one of the order picking departments in the Chicago distributing house of the Western Electric Company. At the end of the room this conveyor turns at right angles and continues for some distance along the second side of the building.

The portion of the conveyor after it makes the turn is not directly visible from the beginning end of the conveyor, where sits the person in control of the conveyor. But a large mirror at the corner of the room solves the difficulty.

Selling by Seeing—and Operating

JUST because you may sell a product which looms 30 ft. up in the air and covers a goodly fraction of an acre of ground doesn't necessarily mean, on the one hand, that you must drag a prospect out to an actual installation, nor, on the other, that you must rely upon pictures.

H. W. Young, president of Delta-Star Electric Company, has had built a model of the rotating bus outdoor substation his concern manufacturers, which may be placed right on the prospect's desk.

Nor is it a model simply to look at. The switches switch and the busses rotate at the will of the prospect. And the saving in number of insulators or other talking points are at once apparent. Yet this model is but 28 in. high and has a base only 29 in. square.

Models, if they are true working models, have many advantages in selling products too large to pack in a trunk. L.I.T.

How Long to Keep Patterns

IT is no easy matter to determine a policy having to do with the length of time to keep a pattern which is seldom used. Several factors must be considered. One is the value of the pattern measured in terms of its replacement cost. Another is the obligation on the part of the company to the customer to furnish repair parts or castings which require that particular pattern.

No standard practice appears to be in use in the amortization of the pattern account. One investigation reveals that the rate varies from 10 per cent to 33⅓ per cent a year. M. L. I.

Perhaps you too have worked out little cost-cutting plans which are of value. If so, turn them in for use in this idea-exchange—a feature appearing each month in ELECTRICAL MANUFACTURING *under this heading "Ready to Apply." Ideas accepted will be paid for at a liberal contribution rate.*

We Wish Manufacturers Would—

A plea for certain new household appliances and for certain changes in existing ones

By Phyllis Krafft Dunning
Home Service Director, The Society for Electrical Development, Inc.

SOMEWHERE we have read or been told that the best inventions are usually made by persons on the lot. That is, the best button-making machines will be conceived by persons engaged in the button-making profession. This has always seemed to us logical, reasonable and as it should be, and after working intimately with electric household equipment we are in no wise inclined to alter our opinion.

We are willing to get right up in meeting and say that as far as we can see the majority of electrical equipment being offered to women today was invented and designed by men who had never done a day's housework in their lives. As a result of this phenomenon homes are full of equipment which is never used, once the novelty of it has worn off, and there is weeping and wailing and gnashing of teeth and crying aloud that women don't appreciate the benefits of electricity.

If you have an extra inventor hanging around your plant it would be a swell idea to send him home to do the family housework for a month or so. If he didn't come back with a whole covey of ideas for new appliances and ways of improving your present products you should fire him because he isn't half the inventor you think he is. It would be a good plan if you could send a rather *weak* inventor to make this domestic experiment, because most women aren't particularly powerful, and your inventor must learn that what is an easy lift or a simple pressure for a man is at least a major exertion for a woman. Your inventor must learn to keep his mind not only on the equipment he is designing but on the women who are going to use it.

WHEN this manufacturing millennium is attained it will no longer be necessary to hold lengthy conferences about ways and means of getting electrical equipment into the home. When you make appliances women can manipulate, women will buy them, and what is equally important, they will *use* them.

We believe it is as important for a woman to use a machine as to buy it, not only from the central station's viewpoint but from the manufacturer's viewpoint. If Mrs. Jones buys a machine and it turns out to be a nuisance to use, even though it does a creditable job, it won't *get used*. And you can bet that none of Mrs. Jones' friends will buy such a machine. Or any of their friends. And so on. In order to get women wheed up about electrical equipment we must be able to offer them not only equipment which will do the work for which it is designed, equipment which is well constructed and durable, but also equipment which is *convenient*.

There isn't much hope of any helpful suggestions emanating from the site of operations, either. Give the average woman a machine, and provided that machine does not stop functioning she will not complain about it—certainly she will not suggest any way it might be improved. She will just tuck it away in a closet or an attic and let it go at that.

The classic example of what we mean is to be found in a certain investigation which was conducted not long ago. A piece of household equipment was placed in the homes of some hundred women, who were asked to keep records of the machine's performance and to tell their opinion of the device. The reports of the machine's performance were excellent and practically all the women praised the equipment. But only an infinitesimal number bought the machine which they had been using with (apparently) entirely satisfactory results. It was a nice machine, a lovely machine and they liked it all right, but they didn't want to but it, thank you just the same. Can you beat it?

PROBABLY not one constructive suggestion as to what might be done to improve that machine so that they *would* want to buy it was offered by one of those women. Women don't offer constructive suggestions. They just don't want to have anything to do with the appliance.

The horrible example of the equipment field is the vacuum cleaner. We have seen all sorts of figures on the percentage of vacuum cleaners which are resting quietly in closets. We forget just what the latest percentage is but it is appalling. And if you ask us why we believe vacuum cleaners are so inactive we will tell you that we blame it all onto that thousand and three feet of cord which must be wound and unwound every time the machine is used. Now, is there any reason why the hooks on which that cord is festooned should not be placed at the extreme ends of the handle, thus necessitating a minimum of loops? Or why can't the hooks be placed at opposite ends of a shaft, pinioned at the center to the handle, the shaft able to revolve when winding or unwinding the cord? A simple thing, but what a talking point for any vacuum cleaner!

We have it from a reliable source that cords give more trouble than any other one thing about electrical equipment, and we certainly believe it. There is no society for the prevention of cruelty to cords, and the abuse they come in for is enough to wring tears from the hardest heart, espe-

cially since their manufacturers in no wise purposed them to stand even a *little* abuse.

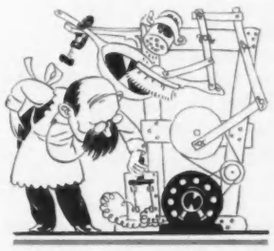
Take, for instance, the universal method of disconnecting a cord. It is accomplished by grasping the cord firmly and yanking on it. Lots of us know that we shouldn't do this, but life is short and catching hold of the little round knob that is squashed affectionately close to the baseboard is rough on fingernails as well as difficult of accomplishment. Consequently cords are yanked until they pull apart or short circuit and blow a fuse—and maybe when this happens you think the lady of the house's impulse is to rush off and get another cord or get that cord fixed. Ha! ha! and pooh! pooh! If she has another cord in the house which will function on the appliance she uses that other cord. If she hasn't the chances are ten to one that it will be a long, long time before that appliance goes into use again—unless it is an awfully important one like the iron.

We have seen toasters, percolators, waffle irons, grills and so on fall into a state of innocuous desuetude simply because their cords were out of commission. This may not bring tears to the eyes of anything but a Central Station, but it would be a swell talking point for any appliance where the salesman could point with pride to a reasonable wall plug, a graspable wall plug, an enduring cord set.

Next we come to the matter of switches in the plugs. Why, in this civilized day and age, are manufacturers still selling table appliances with heater connectors having no switches in them? We understand that switch connectors cost more. All right, add it to the price of the appliance, for switch connectors add immeasurably to the convenience of table appliances. Let us reconstruct a little scene for you which will give you the idea of just how much it adds.

IT IS Sunday morning breakfast time at the Joneses, and Mrs. Jones is making toast for Mr. Jones. As she passes him the most recent product of the neat electric toaster at her elbow Mr. Jones states that he won't want any more toast and Mrs. Jones disconnects the heater connector.

Presently Mr. Jones changes his mind and wants another piece of toast. The heater connector is discovered to have fallen on the floor and either Mrs. Jones has to do acrobatics to recover it or Mr. J. has to get up and pick it up for her. (Which happens depends upon many marital factors into which it is not our purpose to inquire.) After making the requested slice of toast and being again assured that no more will be desired Mrs. Jones again disconnects the appliance.



Shortly Johnny Jones comes in and wants toast. The heater connector is again discovered on the floor. In fact, every time you disconnect a table appliance the heater connector will fall onto the floor. Don't ask why. It just does. This is very bad for the heater connector as well as unpleasant for the operator of the appliance. So won't you nice manufacturers discontinue the use of the old fashioned connectors and give us ones with switches in them—not only from philanthropic motives but because it will prove an excellent talking point for your appliances?

Just one more word before we pass on from cords. Appliances which have the cord attached to them should always have something upon which the cord can be wound up. For instance, the small hand vacuum cleaners have about 20 feet of cord which seem like ten thousand feet when you try to wind it up for stowing away purposes. You can't wrap the cord around the cleaner very well, because it takes a long time to do it and longer to undo it. If you just roll it up on your hands it is forever getting unwound and falling down off the shelf or something. A little wooden reel, entirely separate from the cleaner, upon which the cord could be coiled and fastened when not in use would be a very endearing feature.

We'd like to tell you a few things about certain appliances, but Mr. Dennis, the editor, won't let us. Mr. Dennis says, "Cut out your complaining and tell us a few of these appliances you say every home needs. That might be news." All right, Mr. Dennis!

It should be apparent to anyone who has ever lived indoors that homes are full of a great deal of wooden furniture. Now, wooden furniture needs polishing and lots of it. The fact that it doesn't get it is largely attributable to the fact that polishing is no fun. It takes time, strength and patience. Now why isn't there a little gadget with a tiny motor and a pad on a sliding device or a crank arm which could be held in the hand after the manner of the hand vacuum cleaner and used on the family tables, bureaus, chairs and so on? The pad should be easily changeable for applying oil or wax or just rubbing. There is a lot more wooden furniture in the home than there is upholstered—you have given us the means to care for the upholstered, now come across with a device to care for the wooden.

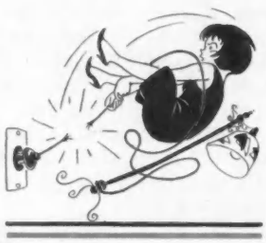
Next consider the dish washing situation. You have made lovely dish washers for the home, but the women aren't exactly falling over themselves in unbridled enthusiasm to secure them. So come down off the high horse and give us a mop, similar to a dish mop, which will be controlled by a switch which will, when pressed, cause the mop to revolve slowly or rapidly as the operator desires. This mop shall have an interchangeable stiff bristled brush for use on pots and pans. Such a device plugged in over the kitchen sink would take the place of the hand mop and brush and would definitely expedite the dish washing job. Both mop and brush should be easily renewable.

And what have you done about dusting? Of all the tedious, everyday, monotonous jobs that is the limit! There is not only the going over the landscape with a piece of cheese cloth, but also the necessity of disposing of that dust every few seconds. It is becoming more and more of a problem of how to dispose of it, too. Apartments forbid window and dumb-waiter techniques. Won't some bright soul come out with a felt protected nozzle to put over the mouth of the hand vacuum cleaner so that it can be slid over the tops of polished furniture and such without scratching and will be thick enough and flexible enough to get into irregular places and produce suction sufficient to lift dust. In this dusting business wide coverage is more desirable than great lifting power.

AND how about an inexpensive air humidifier? On all sides we hear yelpings about the need of keeping our rooms at such and such a temperature and humidity, but just try and do it. The humidifiers now available are too expensive for the average home, and many of us don't want ornaments; we want a businesslike device we can stick away somewhere out of sight and forget, except to fill it with water ever and anon. We want a device which will enable us to keep the atmosphere in our homes in such a condition that our skins won't all dry up and get to feeling like nutmeg graters. (Swell advertising idea there.)

Then there is the electric iron. We have had irons which have stands an inch or more from the level of the board

upon which the iron does its work. We have had irons which have heels upon which to tip them back when there comes a pause in the ironing processes. But we have never had a laundress which used either the stand or the heel, preferring instead to burn holes in the ironing board by leaving the hot iron standing at one end of it. We have, furthermore, noticed that we ourself are not given to using either the rest or the heel when doing a bit of pressing. It is too much work either to lift or to tip. So why doesn't some smart manufacturer devise a rest with an inclined plane toward the board so that the iron could be coasted into a safe resting place when it is not in use?



Outside of a device for warming the baby's bottle, what has the electrical industry contributed toward the simplification of infant food preparation? Maybe the electrical industry hasn't heard that nowadays most children are brought up under the guidance of a baby specialist or a clinic or some informatory organization, and that one of the first things the mother is told to do is to feed the infant cereal which has been cooked four hours and vegetables which have been steamed for two hours.

Now, how about an electrical double boiler, the inset pan to be divided into three sections, one large and two smaller. In the large section the cereal can cook, and in the smaller ones the vegetables. Later on it can be used for puddings, potatoes and such into the bargain. Make the water container large enough so that sufficient water for at least four hours can be put in, and have the heating unit provide just enough heat to keep the water simmering.

We have been given big ironing machines which will, so they say, do all the family ironing. Well, what most of us want is a *little* ironing machine which will handle just napkins, handkerchiefs, tea towels and similar small, flat things of which the average family laundry contains huge quantities. Granted that the big ironer will do these things, many of us don't want or can't afford a big ironer, so mayn't we please have a *little* one we can clamp on the ironing board which will handle the dozens of small, flat pieces which are the real time-consumers on ironing day?

Then how about a toaster with two heat intensities? This could be done by double-wiring the toaster, and equipping it with a two-heat switch, so that those of us who must eat our toast in a hurry and dash for the eight-seven can snap the switch on high and have our bread tanned in less time than it takes to sugar the coffee, while those who have time for leisurely eating can switch the toaster on "Low" and enjoy the delicious caramelized flavor of bread which has been toasted somewhat slowly.

Now here's a thought which your own little inventors will have to work out because all we know is that the need exists, not how to fill it. We know that in large hotels and restaurants there is a device for peeling vegetables—that you just toss the vegetables into a pot, press a switch and "bimeby" the vegetables are all scraped and ready for the cooking to start. Can't some one work out an inexpensive model on a small scale which will take care of the family potatoes, carrots, turnips and so on? We *wish* some one would!

"this and that, here and there"

◇ ◇ ◇ A camera that can be swallowed and by electrical means will take pictures of the stomach's interior was recently demonstrated at a meeting of physicians. The camera is mounted at the end of a flexible rubber tube which carries inside it wires which flash a tiny electric lamp, thus taking the picture.

◇ ◇ ◇ An "electric eye," as the photo-electric tube is quite widely called, is now watching haze conditions in the Holland Tunnel, that widely used traffic artery between New York and New Jersey under the Hudson River. What it "sees" it records as a curve on a chart.

◇ ◇ ◇ The beneficial effects of the standardization of lamps, which have been so evident in the United States for some time, are now being reflected in the British press. An English paper points out that "The recent reduction in the prices of lamps affords a striking example accruing from standardization, and only became possible because a large proportion of the demand for general lighting service lamps of 15, 25, 40, 60 and 100 watts was and remains diverted to the Pearl simplified line. Thus standardization, so long desired by the manufacturer to reduce manufacturing costs, also produces practical benefits to the trade and user alike, since it gives users better and cheaper lamps than ever before."

◇ ◇ ◇ There *is* something new under the sun. An air-brush is now available which will apply one, two, three or four colors in the same time as previously required for one color. The operator quickly selects the color he wants from a cluster of half-pint containers held in his hand and adjoined to his spray head.

◇ ◇ ◇ What better indicator is there of the industrial activity of the country than the output of the electrical power plants. In January and February of this year there was an increase of 2½ per cent in the amount of electrical energy distributed in the manufacturing centers of the United States.

◇ ◇ ◇ A sixteen-inch pipe line, 205 miles long, is now being laid from Jal, N. M., to El Paso, Tex., to transmit natural gas. In the entire 205 miles there will be no bolted joints. The whole line will be made into one continuous piece by means of electrical welding. To complete the job a total of 27 welding equipments are being used.

◇ ◇ ◇ One industrial engineering concern has hired an electrical engineer solely to study profitable photo-electric tube applications for clients' plants.

◇ ◇ ◇ The first rivetless cargo vessel, a 2500-barrel oil tanker, has just been completed in the shipbuilding yards of the Charleston Dry Dock and Machine Company, Charleston, S. C. The vessel was constructed entirely by the electric arc welding method. Eight thousand pounds of welding wire were used against 86,000 pounds of rivets.

Price Maintenance Bill Disapproved by NEMA

THE Kelly-Capper Bill as now amended has, after careful study, been disapproved by the Law Committee and the Board of Governors of the National Electrical Manufacturers Association. These bodies feel that in its present form the bill has certain vital features which they consider objectionable.

The original bill on maintenance of resale prices as first offered in April, 1929, was investigated and received approval of the Law Committee and the Board. Since that time the bill has been amended by the Committee on Interstate and Foreign Commerce to whom it was referred by the House of Representatives. That committee reported on Jan. 27, 1930, recommending the passage of the amended bill.

The reasons given for the disapproval of the amended bill by the Association's Board and Law Committee are as follows:

"The Kelly-Capper Bill was formally approved by the Board of Governors because it intended to provide, and did provide, for complete resale price maintenance: that is, from manufacturer to the ultimate seller to the consumer, and was concerned solely with resale price maintenance.

"The present Kelly-Capper Bill, as amended by the Committee on Interstate and Foreign Commerce, does not provide that the manufacturer can by contract enforce resale price maintenance up to the last seller to the consumer. It provides only for a contract for resale price maintenance between the manufacturer and the first person to whom he sells. The person to whom he sells may in turn contract with his purchaser for resale price maintenance, but any seller can only contract with the purchaser from him.

"The net result of this would be in the electrical business where distribution is through jobbers and then dealers, that the manufacturer could compel the jobber to resell at a price stipulated by the manufacturer, and the jobber could compel his dealers to resell at a price stipulated by the jobber, but the manufacturer could not control the resale price which the jobber could stipulate, and the result might easily be that jobbers selling the same line of goods would stipulate different resale prices for the dealer.

"Section 2 of the Bill as amended is ambiguous in that it is not clear whether anyone selling for resale at retail in the same city or town must sell at the same price to every purchaser regardless of quantity.

"Section 2 also provides that a contract for price maintenance shall not prevent the selling at other than the stipulated price toward the end of a season of a surplus stock of goods specially adapted to that season. There is too much indefiniteness in the use of the phrases 'toward the end of the season' and 'specially adapted to that season'."

The amended bill, designated "House Calendar No. 99, H.R. 11, Report No. 536," is as follows:

A BILL

To protect trade-mark owners, distributors, and the public against injurious and uneconomic practices in the distribution of articles of standard quality under a distinguishing trade-mark, brand, or name.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

That no contract relating to the sale of a commodity which bears (or the label or container of which bears) the trade-mark, brand, or trade-name of the producer of such commodity, and which is in fair and open competition with commodities of the same general class produced by others, shall be deemed to be unlawful, as against the public policy of the United States or in restraint of interstate or foreign commerce or in violation of any statute of the United States, by reason of any agreement contained in such contract—

That the vendee will not resell such commodity except at the price stipulated by the vendor.

Sec. 2. Any such agreement in a contract in respect to interstate or foreign commerce in any such commodity shall be deemed to contain the implied condition—

(a) That during the life of such agreement all purchasers from the vendor for resale at retail in the same city or town where the vendee is to resell the commodity shall be granted equal terms as to purchase and resale prices;

(b) That such commodity may be resold without reference to such agreement—

(1) In closing out the owner's stock for the purpose of discontinuing dealing in such commodity or of disposing, toward the end of a season, of a surplus stock of goods specially adapted to that season;

(2) With notice to the public that such commodity is damaged or deteriorated in quality, if such is the case; or

(3) By a receiver, trustee, or

Nema Points Out

1. **That the present Kelly-Capper Bill does not provide for the complete maintenance of prices**
2. **That the bill permits too much leeway for the fixing of prices by the "middleman"**
3. **That the bill is not definite in its provision covering the selling of surplus stocks**
4. **That the bill is ambiguous with regard to retail selling in local territory**

other officer acting under the orders of any court or any assignee for the benefit of creditors.

Sec. 3. Nothing contained in this Act shall be construed as legalizing any contract or agreement between producers or between wholesalers or between retailers as to sale or resale prices.

Sec. 4. As used in this Act—

(1) The term "producer" means grower, packer, maker, manufacturer or publisher.

(2) The term "commodity" means any subject of commerce.

Approval for Trade Practice Meetings

The Federal Trade Commission has approved with some changes the resolutions for six branches of electrical manufacturing offered at trade practice conferences in Washington, Oct. 10, 1929, by members of the National Electrical Manufacturers Association. The approved rules are for the following industries: carbon, flexible cord and heater cord, outlet box and conduit fittings, molded products, manufactured electrical mica and vulcanized fiber.

The rules for each of these industries as set up by the Commission March 3 to March 10 are divided into two groups. Those in Group I are regarded by the Commission as condemning unfair methods of competition in violation of the law and these rules were affirmatively approved. Those in Group II were accepted as expressions of the trade concerned.

In Group I are such subjects as secret rebates, discrimination against customers, threats to customers, selling below cost, defamation of competitor, interference with contract, enticement of employees, espionage, misbranding and misrepresentation.

Group II relates to such subjects as price differentials, price list publicity, uniform contracts, secret prices, special services to customers, influencing sales by gifts, brokerage payments, split shipments, guarantee against change in price, consignment, long-term contracts, freight charges, breach of contract, deviation from standards, labeling, arbitration, etc.

For each of the industries the Commission authorized a committee on trade practices to investigate whether the resolutions are being observed and to cooperate with the Commission in making the rules effective.

First Uniform Accounting Bulletin Issued by Director

The first issue of the "Uniform Accounting Bulletin" was sent out March 1, by Thomas W. Howard, Nema director of uniform accounting. The purpose of this bulletin is to place in the hands of those who ask to receive it current information in regard to the progress of the uniform accounting movement in the industry. In addition, it offers an opportunity for the presentation of information on technical accounting matters in non-technical language.

Occasionally, says the Bulletin, a manufacturer whose trade association is sponsoring the uniform accounting movement says, "I already have a good cost system. I don't propose to go to the additional expense that will be necessary if I install the uniform system."

There are several convincing answers to this argument. The chairman of the Cost Accounting Committee, S. L. Whitestone, presents one of the best. He points out that no company which already has a good, modern cost accounting system will need to go to great expense, if to any, in adopting the uniform system. In such a case the problem is solely the harmonizing of the existing system with the uniform system. The manufacturer will unquestionably find that in the process of chance he has made a good system a better one.

Patent Law Changes Opposed by Nema

OPPOSITION to the proposed changes in patent laws provided by the Dill Bill has been voiced by Nema through its Committee on Legislation Affecting Electrical Manufacturers. This measure, introduced in the Senate by Mr. Dill on Jan. 31, provides that the defendant in a suit for infringement of patent may interpose as a complete proof that the plaintiff is violating anti-trust laws.

The Nema committee's report states that the bill is unjust and inequitable and if enacted into a law would seriously impair property rights in patents to the detriment of inventors and industry; would inject new and dangerous issues into the now complex patent suits; would practically prevent the issuance of temporary injunctions in patent infringement cases, and would cause loss to innocent workers and the public.

Street Lighting Section Actively at Work

Every member was present at a meeting of the Street Lighting Section held in the Westinghouse Institute, New York, Feb. 19.

The collection of sales statistics was agreed to on a quarterly basis instead of monthly, as had been previously suggested. The section decided to undertake the task of classifying different street lighting equipment into groups. A committee was appointed to handle this work.

The problem of collection statistics on closed transactions was considered, but it was unanimously decided to defer definite action until the classification of equipment has been fully completed.

The committee which is engaged in the collection of information on State legislation pertaining to the installation of street and highway lighting reported that it had been active. A great deal of work is involved, however, which is expected to keep the committee occupied until the fall.

A non-member company, the Philadelphia Electric & Manufacturing Co., was represented at the meeting by R. A. Mainwaring, who signed an application for membership.

Cooperative Advertising Campaign Sponsored by Welder Manufacturers

Cooperative national advertising by six manufacturers of electric arc welding equipment was started in the January issues of seven industrial and business magazines. Advertisements will appear in each paper for a period of one year. The purpose of the advertisements is to draw attention to the general advantages of arc welding in joining steel parts.

The first of the series showed a huge figure of a man clad in a welder's costume and accompanied by a heading, "I Am Arc Welding, A Dominant Figure in Industry." The text explained some of the advantages of using arc welding. The second in the series showed the figure representing arc welding presenting himself before two executives and declaring, "I Am Arc Welding; I will make sales easier." The text went on to describe the significance of arc welding as a sales argument.

This campaign was launched as the result of suggestions made by members of Nema's Electric Welding Section.

Electrical Patent News

A new department intended to give readers practical advice and useful information on the subject of patents, trade marks and designs

RAY BELMONT WHITMAN
Patent Attorney

THE subject of patents is one with which we are all concerned, because practically every electrical manufacturing organization in this country has been founded either directly or indirectly by reason of rights or monopoly obtained through patents or inventions. Despite this condition the principal trouble with many business executives is not that they fail to recognize the need for some knowledge on the subject of patents, but rather that they have been taught to believe a large amount of a heterogeneous mass of common misinformation that is generally accepted by laymen as current patent law. The most of these misconceived ideas concern the very nature of patents themselves.

More than 1,700,000 patents have been issued in the past 100 years or more, and at the present time approximately 40,000 patents issue every year, and an equal number of applications is filed which never issue into patents. With all of these there are in all probability some 100,000 inventions conceived which, for one reason or another, never reach the application stage.

The Constitution of the United States empowers the Congress to "promote the Progress of Science and Useful Arts, by securing for limited times to Authors and Inventors exclusive Right to their respective Writings and Discoveries."

Pursuant to this authority the Congress on April 10, 1790, enacted the first patent statute, the terms of which have remained substantially unchanged since 1870.

Under this law, the Commissioner of Patents, after an examination has satisfied him that the applicant is the original and first inventor of some new and useful improvement, will grant to the applicant a patent, which will give to him an exclusive monopoly to prevent others from making, using, or selling his invention for the first seventeen years after the issue of the patent, in return for his mere disclosure to the public and its use after the date of expiration of the patent.

Our patent laws are generally recognized as the most liberal in the world. Nowhere else can a man having a patentable idea acquire success as easily as a result of protecting and marketing it. It has been well stated that practically all of us are sufficiently original to have conceived at sometime in our lives at least one idea which is really a valuable invention, yet the trouble usually is that we fail to realize this fact and neglect to take advantage of our opportunity to protect and market the idea.

In the beginning it is considered advisable and highly important to correct an almost universal misconception relating to patents and one that is alone responsible for many serious losses to the misinformed. It is that a patent does not, as many believe, give to its owner the right to manufacture, use and sell the invention. It merely grants the right to exclude others from making, using and selling the invention as specifically covered in the claims of the patent.

The inventor who has conceived an invention, providing no one else has previously been granted a patent on it, has already the right to make it, use it, and sell it, as he chooses. This is his common-law right and everyone else has the same right. Our Government, by enacting our patent laws, has sought to encourage invention by granting to every inventor who applies, an exclusive right for the first seventeen years to prevent others from making, using, or selling the invention claimed. If, however, this right has been previously granted to another on any part of the invention, then the later inventor is simply estopped from using previous inventions as is the public in general.

Most inventors, and indeed many otherwise intelligent manufacturers and purchasers of patents, fail to grasp this situation. As a result, they proceed on the basis that the patent, having been granted by the Government, gives them the right to use the invention. But, as most patents are in the nature of improvements over older devices, it is frequently necessary for the inventor to employ one or more of such older devices in order to make use of his new invention. And, as it sometimes happens that some such former device or method is already covered by a patent grant to a prior inventor, the inventor then finds himself in the unfortunate position of not being able to use for himself what he can prevent others from using. This very important point should always be borne in mind when dealing

WITH this issue we inaugurate a new service. It is recognized that the subject of patents is one that is not only vital to many electrical manufacturers, but it also has a wide public interest for its informative value. This department will be under the management of Mr. Ray Belmont Whitman, patent attorney, of New York City, who will prepare from time to time articles on the subject of patents, together with excerpts from letters patent. In addition he offers to the readers of ELECTRICAL MANUFACTURING personal advice without obligation on any such matters relating to patents. Mr. Whitman has had many years of experience as a patent counsel and consulting engineer for some of America's largest corporations and is also the author of books on matters relating to patents, trade marks and designs.
—THE EDITOR.

with patents.

There are many ramifications to the patent situation and laws governing patents. In like manner there is a distinction between patents, trade marks and designs. A patent is a grant by the Government of rights for seventeen years to exclude others from making, using or selling anything within the scope of any one of such claims of the patent as may be held valid by the courts.

Trade marks and designs exist by virtue of their use by their owners, and all that the registration of the trade mark does is to add the right to resort to the Federal courts for protection against users who might infringe on the use of such trade marks and designs.

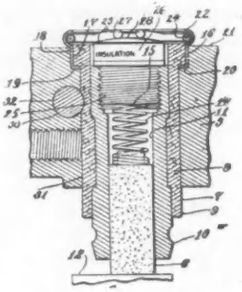
We are living in an age of invention, and the Patent Office at Washington is issuing patents at the rate of 1000 a week. For this reason there is hardly an industry or mercantile concern in the United States that might not find its own business status materially altered overnight by the mere issuance of a patent. For this reason it is the intention of ELECTRICAL MANUFACTURING to continue to publish information about patents and their many ramifications. With this information will be excerpts from new patents as they relate specifically to products of electric manufacturers. In addition to this service ELECTRICAL MANUFACTURING offers to its readers advice on the subject of patents and a column under the heading of Questions and Answers will contain considerable valuable information on this subject each month.

There will be found immediately below on this page a few illustrations and abstracts from patents in the electrical industry which have been recently granted.

Recent Patents of Electrical Apparatus

Brush Holder for Electric Tools

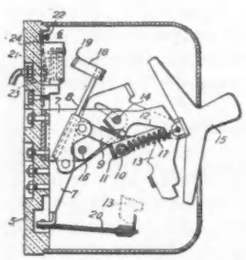
1,751,462. JAMES NELSON BAKER, Baltimore County, Md., assignor to The Black and Decker Manufacturing Company, Towson Heights, Md., a Corporation of Maryland. 7 Claims.



The combination in a portable electric tool of an electric motor, brushes, brush holders of circular cross section, a casing and a set screw seated in the casing substantially tangent to the brush holder so that the threads of the set screw bite into the side of the brush holder casing.

Circuit Breaker

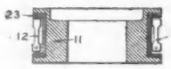
1,750,298. ALFRED CORBETT, Irwin, Pa., assignor to Westinghouse Electric & Manufacturing Company, a Corporation of Pennsylvania. 4 Claims.



A circuit breaker comprising a pair of spaced contact members, a pair of connected spaced contact blades for engaging the contact members, a separate metal arc quenching barrier for each blade disposed across the path of movement of the blade and provided with an opening through which the blade moves, the said barriers being spaced and insulated from the contact members, and a metal arc quenching barrier superimposed in spaced relation to the first barriers and provided with openings through which the blades move.

Alternating-Current Motor

1,750,076. HANS WEICHSEL, St. Louis, Mo., assignor to Wagner Electric Corporation, St. Louis, Mo., a Corporation of Delaware. 2 Claims.



In a dynamo electric machine provided with a commutator and brushes, means for short-circuiting the commutator which comprises a collar mounted on the shaft of the machine and provided with a circumferential recess and commutator short-circuiting elements carried in said recess, centrifugal means for moving the brushes out of contact with the commutator and for moving the short-circuiting elements into operative position with respect to the commutator, and means insulating the short-circuiting elements from the collar.

BEGINNING in the next issue, ELECTRICAL MANUFACTURING will conduct a department of "Questions and Answers" as they relate to patents and kindred subjects. Readers are urged to avail themselves of this free service.

With this department we will continue to publish abstracts from new patents.

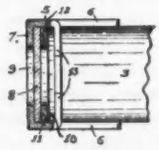
Address all questions to the Patent Editor, in care of ELECTRICAL MANUFACTURING. Write on one side of the paper only, giving full name and address and business connection. (Only initials will be published if requested.)

Copies of any of the patents cited can be obtained by sending 15 cents to the Patent Editor, in care of ELECTRICAL MANUFACTURING, for each copy wanted.

Luminous Electric-Light Switch

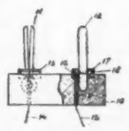
1,749,881. MARCUS HOLPFER, Coraopolis, Pa. 1 Claim.

In an electric light switch including a light operating member in the form of a push plug, a slotted thimble open at both ends thereof and adapted for clamping engagement with the forward end of said push plug, a disk provided with a luminous front face mounted in the outer end of the thimble a transparent member mounted in the thimble for covering the luminous front face of the disk, means for spacing the disk from the transparent member, and a pair of tongues stamped from the thimble in the formation of the slots in the latter and bent to engage the disk for securing the latter and the transparent member in position in the thimble.



Contact Plug

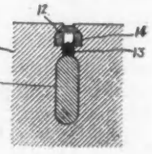
1,751,981. HENDRIK DE JONG, DIRK LELY, JR., and RICHARD SHEPHERD, Eindhoven, Netherlands, assignors to N. V. Philips' Gloeilampenfabrieken, Eindhoven. 12 Claims.



1. An electric contact plug having contact pins consisting of two or more resilient solid parts disposed against each other, the ends of said parts being embedded in the insulating material and joined together forming a spliced ring at the point of joining.

Induction Motor

1,752,097. HANS LUND, Berlin-Schoenberg, Germany, assignor to General Electric Company, a Corporation of New York. 25 Claims.



1. A rotor element for a dynamo electric machine comprising a core member and a pair of windings carried by said core at different fixed radial positions therein, and means dependent upon the speed of rotation of said element for varying the reluctance of the flux path between said windings.

Modernization of Industries Campaign Is Under Way

A nation-wide drive has been launched for the express purpose of encouraging the rehabilitation and modernization of industrial plants

THE Electrical Association of New York launched in March a Modernization of Industries Campaign, which includes both a drive for remotorization and replacement of other outworn electrical equipment in industrial plants throughout the Metropolitan district.

This campaign is part of a nation-wide drive, the expression of an idea conceived by Louis Kalischer, an electrical contractor of Brooklyn, N. Y., as one important means of supporting President Hoover's policy, adopted following the Wall Street depression last fall, in favor of wise checks against unnecessary slowing up of business.

As chairman of the committee handling the modernization activity, Mr. Kalischer has done considerable traveling in the West, in an attempt to enlist the support of contractors, electrical manufacturers and industrial executives in this scheme of general industrial plant rehabilitation and modernization, particularly with respect to electrical apparatus. The details of the plan were worked out by the association's Market Development Subcommittee on Modernization of Industry, W. B. DeForest, chairman, W. Creighton Peet and C. K. Nichols.

AS a part of the campaign to be conducted throughout the country as a contribution to the Hoover program for wise checks against business slow-up tendencies is a drive conceived by an electrical contractor of Brooklyn, N. Y., and sponsored by the Electrical Association of New York, intended to enlist the support of all manufacturing executives in the immediate remotorization or replacement of motor equipment and other industrial electrical apparatus in manufacturing plants

The 30,000 industrial plants in the Metropolitan district will be reached through advertising and personal calls with the message of electrical modernization first in terms of remotorization or replacement of motor equipment to be followed by modernization in the more general sense to include all electrical equipment. The cooperative aspect of the plan extends only to the selling to the industrials of the modernization idea by all interested electrical groups. Each individual business organization will be stimulated to go out and sell more of its own apparatus, equipment, or service.

In outlining the plan Mr. Kalischer said:

"Immediately after the 'late unpleasantness' in Wall Street, President Hoover called a series of conferences of business executives to stabilize business and to restore confidence.

"As chairman of the Motor Section of the Joint Committee, I immediately communicated with Mr. Stronman of the Westinghouse Company, who is chairman of the Manufacturers Group, and suggested:

" 'A plan to organize a nationwide drive for remotorization or replacement of motor equipment at this time. Primarily, this is to sell the idea to the industrials or users to replace every motor that is obsolete, in a bad state of repair, underpowered, or where the speed conditions or characteristics are unsuitable for the work. In other words, to modernize industries.

" 'With the stimulus given to a movement of this kind, a great deal of new business could be uncovered.

" 'The plan might further be amplified by talks by key men at luncheons of the various chambers of commerce, etc., to follow through on the President's plan for the continuance of prosperity and to check any tendency to slow up business at this time.

" 'Incidentally, I don't think a plan of this kind would hurt any business organization. I would bring home not only to the executives but also to the employees that we all have to go to work again and forget about the joy ride most of us have been indulging in the past year or two, and, for the time at least, the era of easy business is over and we now have to go out and get it.'

"At the conference in Washington, this same suggestion was made by Mr. Farrell, president of the United States Steel Corporation, who said:

" 'The steel plants of the country, having had a good year, will bring plant equipment up to date to contribute their share to the general prosperity. We do not change our styles or adopt any new models, but we do get a little dip every year in September or December and that is the time that we begin to go around the plants and I might say not only rehabilitate them, but also do a little bit of rejuvenating.'

"This suggestion was emphasized by other executives.

"This was followed by President Collens of the National Electrical Manufacturers Association, the keynote of his statement being:

" 'There are still too many obsolete, inefficient machines and methods in all industry. Modern, efficient machinery properly motorized should be introduced to give improved quality and lower costs. Also there is a need for labor-saving machinery in the flow and handling of materials.'

"Or, in a word, there is a need for electrical modernization of industries to place the small manufacturer in a position to secure the benefits of mass production as applied to his business.

"With the cooperation of the engineering talent of the utility companies, electrical manufacturers and the engineering organization of the electircal contractors, authoritative data can be secured as to the possibility of reduction of costs and refinement of operation in the industries."

Facts, Figures and Trends

Electrical Trade Volume

The accomplishments of the electrical industry for 1929 are clearly indicated by the fact that the production of electricity for public use during the year is now estimated by the National Electric Light Association at 97 billion kilowatt-hours. This is an increase of 9 billion kilowatt-hours over 1928 and an increase of 17 billion kilowatt-hours over the production for 1927. This output nearly equals all of the rest of the world combined.

While the consumption in factories increased 10 per cent, household consumption increased 16 per cent. Approximately 68 per cent of the population of the United States live in electrically wired homes, while in the past seven years 9,600,000 homes have been connected to receive electric service for the first time.

As to the future, electric light and power company executives feel confident of the continued growth of the industry; in fact, the 1930 budgetary requirements for new construction, improvements and expansion of facilities in the electric light and power industry indicate the expenditure of at least $865,000,000, an increase of $65,000,000 over the amount expended in 1929. In addition, upkeep and maintenance of existing facilities will call for an additional $125,000,000 expenditure. In accordance with the necessary practice of the industry, these plans were made far in advance, and orders for much of the equipment and material already had been placed before the end of 1929.

Electrical Exports Rose

The United States foreign trade in electrical equipment for January amounted to $12,724,353, a gain of $2,006,236, or nearly 20 per cent, over January, 1929, according to preliminary figures by the Electrical Division of the Department of Commerce.

Many of the increases registered were in the lighter equipment class, such as radio apparatus, telephone equipment, washing machines and telegraph apparatus. However, substantial gains for such apparatus as generators, steam turbine generator sets, transforming and converting apparatus, some types of transmission and distribution apparatus, 1 to 200 horsepower stationary motors, and accessories and parts for motors also were shown.

Employers Subject to Fines for Lack of Safety Devices

An important decision on safety in industrial establishments has been rendered by the German Supreme Court of Appeals. Under this decision, if an employer has insufficient protective equipment, such as safety devices on machinery, he is not only liable for any damage suffered by his employees, but is also subject to a fine and possible imprisonment.

Number of Appliances in Homes

The humble electric flatiron still leads the procession of electrical appliances in use in American homes. According to a report just issued by the Home Service Subcommittee, Public Relations National Section, National Electric Light Association, there are 18,800,000 of these labor-saving devices

in the approximately 20 million wired homes in this country.

Electric cleaners come second with a grand total of 8,720,000. There are 7,420,000 electric toasters, 7,100,000 electric radio sets and 6,680,000 electric washers in use.

British Consumption of Electricity

The use of electricity in Great Britain has exceeded the estimated growth, according to the Ninth Annual Report of the Electricity Commissioners for the year ended March 31, 1929. During the 12 months authorized establishments proluced 9,473,201,134 kilowatt-hours, while railway and tramway companies and non-statutory undertakings brought the total to 10,878,980,925 kilowatt-hours. This output was an increase of upward of 9.5 per cent on the figures for 1927-28, the larger output being obtained by an increase of only 3.7 per cent in the amount of coal and coke consumed. There was also a faling off by about 4800 tons in the amount of oil fuel used at generating stations as compared with the previous year.

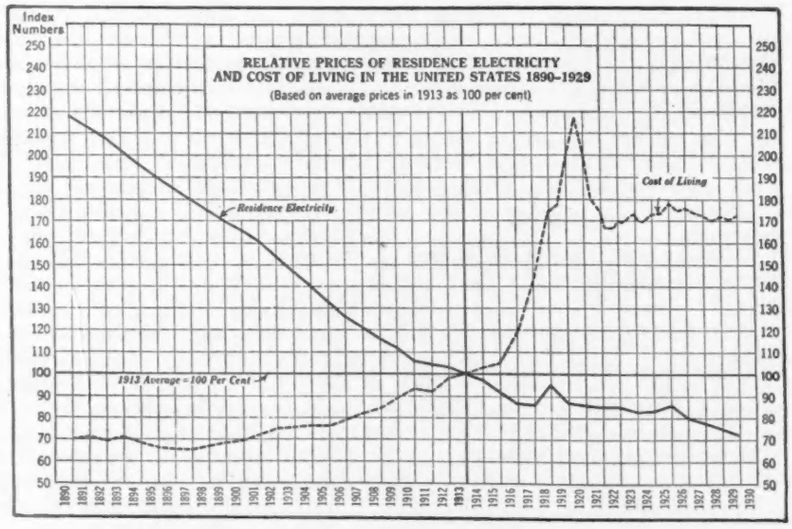
The number of kilowatt-hours sold to consumers amounted to 7,603,240,446, which was an increase of nearly 11 per cent on the figures for 1927, and a total increase of over 108 per cent during the six years since 1922, or an average of 18 per cent per year.

An Electrically Operated Quotation Board

The world's largest electrically operated quotation board has started functioning in the office of a broker in Chicago.

Six hundred stocks are listed on the electric board, apportioned as follows: 400 issues traded in on the New York Stock Exchange; 100 issues traded in on the Chicago Stock Exchange, and 100 issues from the New York curb.

The board is divided into twenty-four sections of twenty-five stocks each. Quotations are printed on rolls of paper similar


Index Numbers
RELATIVE PRICES OF RESIDENCE ELECTRICITY AND COST OF LIVING IN THE UNITED STATES 1890-1929
(Based on average prices in 1913 as 100 per cent)
Residence Electricity
Cost of Living
1913 Average = 100 Per Cent

Comparative Costs of Living and Residence Electricity

to ticker tape, but much larger. The tape will show directly below the stock's ticker symbol the opening quotation, high and low and last sale. Above the ticker symbol will be posted the previous day's closing quotation and dividend rate. Twenty individual quotations for each stock may be printed on the tape, revealing the latest market trends of the individual stocks. The stocks are listed alphabetically.

Three men, located in a control station, will operate the board through an electric keyboard, taking quotations from tickers.

Use of Domestic Power

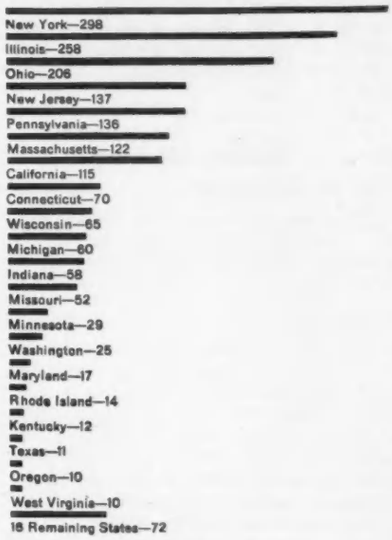
Increased domestic consumption of electrical energy during 1929 was attended by an average decrease in the cost per unit, according to a statement issued by the Statistical Research Department of the National Electric Light Association.

In 1918, according to this statement, the average household in the United States used 272 kilowatt-hours per year for which it paid 8.3 cents per kilowatt-hour. By 1924 this average household was using annually 378 kilowatt-hours, and in 1928 this had increased to 459 kilowatt-hours, but by this time was only paying a rate of 6.55 cents per kilowatt-hour. This reduction in rates was accomplished in spite of the fact that the cost of living and the cost of all items entering into the construction and operation of utility service had steadily increased during the same ten-year period. In 1929 the average American home used more than 500 kilowatt-hours and paid an average price of 6.2 cents per kilowatt-hour.

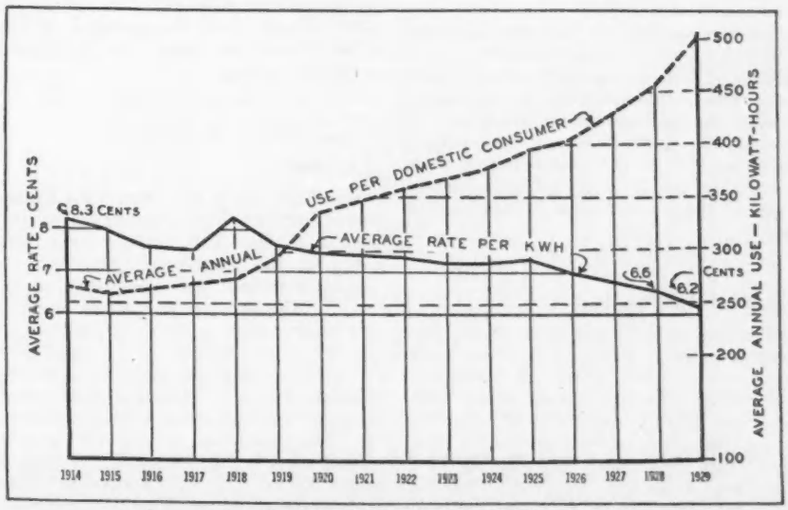
The two accompanying charts show graphically the comparisons between rates and use, and cost of living and rates. The first one shows the steady increase in use per domestic consumer with a steady reduction in the average rate per kilowatt-hour. The second one shows that, assuming an index number of 100 for both the cost of living and the cost of domestic service in 1913, the cost of living in 1890 had an index number of 70 while the cost of residence electricity stood at 220. The cost of living steadily progressed until it stands above 170 today, while the cost of domestic electricity has dropped to an index number of a little above 70.

Locations of Manufacturing Establishments

Of the 1777 establishments reporting for 1927, 293 were located in New York, 258 in Illinois, 206 in Ohio, 137 in New Jersey, 136 in Pennsylvania, 122 in Massachusetts, 115 in California, 70 in Connecticut, 65 in Wisconsin, 60 in Michigan, 58 in Indiana, 52 in Missour, 29 in Minnesota, 25 in Washington, 17 in Maryland, 14 in Rhode Island, 12 in Kentucky, 11 in Texas, 10 in Oregon, 10 in West Virginia and the remaining 72 in 16 other States and the District of Columbia. In 1925 the industry was represented by 1739 establishments, the



increase to 1777 being the net result of gains and losses. Of the establishments gained some had manufactured commodities other than electrical machinery, apparatus and supplies as their principal products in 1925 and the remainder reported for the first time at the present census. Of the establishments lost, some reported commodities other than electrical machinery, apparatus and supplies as their principal products in 1927 and were, therefore, transferred to the appropriate industries, some went out of business prior to 1927, and some were idle throughout the year.



Comparative Consumption and Cost of Electric Power

A Record in Radio Broadcasting

A radio program was broadcast to the listeners of Station WGY, Schenectady, on the morning of Feb. 4 after it had traveled approximately four-fifths of the circumference of the earth in an eighth of a second to go from one Schenectady station to another. The program was originated by Station W2XAF, the short wave (31.48 meter) station of WGY; picked up by Station VK2ME of Sydney, Australia, and rebroadcast; picked up from Australia at Schenectady and re-rebroadcast by WGY—so that the two Schenectady stations, W2XAF and WGY, were sending out the same program, but with a time interval of about one-eighth of a second. To Sydney and back to Schenectady is about 20,000 miles—and the speed of electricity is more than 180,000 miles per second.

The Manufacture of Electrical Machinery and Apparatus

The Department of Commerce announces that, according to data collected at the biennial census of manufactures taken in 1928, the establishments engaged primarily in the manufacture of electrical machinery, apparatus and supplies in 1927 reported a total output valued at $1,637,307,035, an increase of 6.3 per cent as compared with $1,540,002,041 reported for 1925, the last preceding census year. Of the total value for 1927, $1,551,816,138 represents electrical machinery, apparatus and supplies, and $85,490,897 miscellaneous products and receipts for contract work and repairing. The value of electrical machinery, etc., is made up as follows: Batteries, $150,216,485; control apparatus, $33,869,615; electric fans, $10,755,001; generators, motor-generator sets, and automotive starter-motors, $115,179,671; household heating and cooking appliances, $72,933,274; industrial apparatus and appliances, not including motor-driven tools and devices, $12,343,673; interior conduits and fittings, $42,105,294; incandescent lamps (bulbs only), $87,933,204; measuring instruments, relays and instrument transformers, $34,009,999; motors (not including automotive starter-motors), motor parts and supplies, $122,146,337; radio apparatus and radio tubes, $191,228,647; switchboards, circuit breakers and switches, $70,801,619; telephone apparatus and telegraph apparatus, not including wireless, $119,271,904; transformers, induction voltage regulators, and current-limiting reactors, $66,611,334; wiring devices, $32,216,698; miscellaneous electrical machinery, apparatus and supplies, $390,193,383.

New Refrigerator Car Will Improve Fast Shipments

A new development in transportation of perishable products is the automatic iceless refrigerator car, according to *Fruits and Gardens*. This car is operated similarly to an electrical refrigerator, drawing its power from the motion of the axle of the car while the car is in motion. The apparatus also has a supplementary motor which may be attached to any power line to keep the car cool while standing still. Among the many advantages of the new product are the facts, first, that the car is lighter

than a normal ice refrigerator car when fully iced, and, second, that once in motion, the car will never have to be stopped for re-icing.

Test 600,000-Volt Switch

A new switch capable of breaking high-tension electric currents up to 600,000 volts without causing arcing and without resorting to air blasts or oil baths was exhibited today at the Siemens-Schuckert works in Berlin, Germany.

The switch operates in a liquid, the nature of which is not divulged. The observer merely sees plungers rise and notes from the oscillation photographs that the current falls to zero after a few half-oscillations.

Siemens officials expressed pleasure with the success of the switch, pointing out that the oil bath types hitherto generally used never secured a clean break in the current.

Average Loss on Installment Sales

The average loss on installment sales reported by 212 electrical appliance stores for the year 1927 was 1.5 per cent, according to preliminary figures gathered in connection with the Domestic Commerce Division's National Retail Credit Survey. One-half of these stores, including stores of all sizes and in different sections of the country, are reported to have shown losses of less than 0.2 per cent, but a number of them had losses of over 5 per cent on installment sales.

Sale of Electrical Apparatus in Ontario, Canada

Jobbers and wholesalers of electrical apparatus in Ontario have been exceptionally busy during the past year. Increased sales of American-made radio receiving sets, health vibrators, electric washing machines and ironers are reported. One large wholesale concern formerly handling Canadian-made radios, washers and ironers discontinued these lines to take the agency for similar American-made products. It is believed, also that more electric lighting fixtures for home and office use were imported into this district from the United States than was the case in 1928.

Electric Heating on Steam Trains in England

The London & North Eastern Railway report that electric heating has been applied recently to the water used in sleeping cars on the East Coast route night expresses. Two methods are in use at present. By the first method the water is heated at the terminal station prior to the commencement of the journey and maintained at a high temperature by the dynamo and battery installed originally for lighting, the capacity of the apparatus having been increased for this purpose; by the second method an additional independent dynamo and battery are fitted on the car, forming a complete self-contained water heating system.

The use of electricity for subsidiary services has been developed steadily by the London & North Eastern Railway. The first all-electric restaurant car ran on their system between London and Leeds in 1921, current being generated by dynamos connected with the wheels, and electricity is now used for cooking and lighting purposes on all the principal London & North Eastern Railway expresses.

Freight Traffic in 1929 Near Record High

Freight shipments on the railroads of the United States in the year 1929 amounted to 52,789,789 cars, according to the American Railway Association, an increase of 1,199,902 cars, or 2.3 per cent over the total for 1928. This figure was within six-tenths of 1 per cent of the all-time high record of 53,098,819 established in the year 1926.

Electric Washing Machine Market Estimated

There are approximately 6,700,000 electric washing machines now in use in American homes, according to an estimate of the Copper & Brass Research Association.

Since the total of wired homes in this country is now about 19,000,000, the Association concludes that there is a potential market for new sales in approximately 12,000,000 homes. In addition to this there are about 300,000 homes constructed annually, and as the industry reaches greater stabilization, there will be an ever larger and larger replacement market.

The Association goes on to estimate that there is a potential market for approximately 19,000,000 lb. of copper per year in washing machines and in the electrical equipment that goes with them.

Industrial Machinery Exports

Outdistancing all previous records since the more or less abnormal postwar year of 1920, foreign sales of American industrial machinery during 1929 totaled over $257,000,000, thus approaching $1,000,000 per working day, according to a review of the year's trade by the Industrial Machinery Division, Department of Commerce. As compared with earlier years, such sales total only slightly less than those made in 1919, when the postwar boom was at a high level, have substantially exceeded business done in 1921 when the postwar boom, though waning, was still in effect, and are considerably more than double sales made in either 1922 or 1923, the first two years of the lean period which followed the collapse of the postwar boom, it was pointed out.

Cost of Living Index Up

The cost of living as shown by the Bureau of Labor Statistics of the Department of Labor in their survey of thirty-two cities in the country increased seven-tenths of 1 per cent in the six months' period from June, 1929, to December, 1929. The final figure for the year 1929 stood at 171.4, based on 100 per cent for 1913, as against 171.3 for December of 1928, and the high of 192.2 for June of 1920.

Low Income Classes Buy Electric Refrigerators

The progress being made by the electric refrigeration industry in extending their sales to the lower income classes of homes is brought out by a recent survey covering 11,000 families which had bought electric refrigerators on the partial payment plan.

The survey carried on by one of the largest manufacturers of electric refrigeration apparatus brought out the fact that in 1929 more than one-half of their partial payment sales were made to families with incomes of not more than $3,000 a year, one-third of the sales went to families whose income was not more than $2,500 a year and one-fifth of the sales were limited to the class whose incomes did not exceed $2,000 a year.

A similar survey made in 1926 showed that only one in ten sales went to families whose income did not exceed $2,000 a year, and only one in three sales went to families whose income did not exceed $3,000 a year.

Thus it is evident that electric refrigeration is coming to be considered more of a necessity, and that the markets for the apparatus are widening very rapidly.

Construction Estimates Exceeded

A survey covering 85 per cent of the companies in the light and power industries in the United States reports that expenditures for new construction already made this year or to be made before the end of the current month will total $198,000,000, a figure which is 10.5 per cent in excess of the expenditures of the light and power industries in the first quarter of the past year, according to the National Electric Light Association.

In the fall of 1929 the Business Survey Conference was informed that the public utilities of the country would spend $865,000,000 on expansion and new properties exclusive of maintenance of existing facilities during the year 1930, a figure which was approximately 8 per cent in excess of what they had spent in 1929. The fact that the actual expenditures for the first quarter are running 10.5 per cent above the expenditures for the first quarter of 1929, indicates that the promises of the industry have been more than made good in the first quarter.

Water Power Resources of Canada

The Dominion Water Power and Reclamation Service of the Department of the Interior of Canada has issued its annual review of the water-power resources of Canada, developed and undeveloped, as at Jan. 15, 1930, in which it is stated that the total water-power resources of the Dominion are now estimated to be 20,347,400 horsepower under conditions of ordinary minimum flow, or 33,617,200 horsepower ordinarily available six months of the year. The total hydraulic development at the present time is represented by a turbine installation of 5,727,162 horsepower, being an increase of about 378,000 horsepower during the past year.

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New conditions are ahead of us. Some are here now.

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* * *

Dips are turning points—in business history, and in industry's development. Always have been.

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A great new advance,—a correction of direction; a betterment of thinking and method,—is getting ready right now.

It is starting. You can feel it; see it; it is all around you.

* * *

Dips jolt thinking. They jolt minds everywhere, from top to bottom in industry and commerce.

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Just the *hint* of a dip was enough this time. Because men in industry today know more, are better equipped, quicker to see and act.

Even if the hint of a dip is over by the time you read this, the fast, clear, sharp thinking it started is *going onward*. It is getting more momentum. Its results will be permanent.

In industry and business the new direction is being determined.

* * *

Already you see the changes, the trend . . . New thinking. New planning. New openness of mind. New search for Useful Knowledge;—for the new facts on which new ideas *and new action* can be based.

You see re-designing everywhere,—for profit,— for better margin. For better position in competition. For betterment of the various satisfactions that can be delivered to the consumer or user;—better performances, better values. Re-designing for better adjustments to the present and coming Consuming Power and Purchasing Power.

New designs, new tries, new modifications of present designs,—they are going on everywhere.

* * *

In mass-production; realize what is happening—New realization that mass-production principles don't stand still. That they grow and change. That the new, more highly perfected Principles of mass-production are on the way, and *taking shape right now.*

The New thoroughness—you feel it everywhere you turn—can't shut your eyes to it. New balancing of considerations. New determination to find and weigh EVERY consideration that has a bearing on design, purchase, capital, profit, or competition.

New realization that, in past designing and purchasing decisions or plans, too many considerations have been left out of the scales.

New searching out of the Wastes that in easier days were allowed to exist; "leech wastes" that *now* are stopped by the new, more complete balancing of *all* considerations.

* * *

In all production, of small quantities or large, you see more "hand to mouth." And keener planning for it.

More search for the best conveniences, cooperations, services, and certainties as to later supplies and prices.

Sharper looking-ahead, even where small or try quantities are concerned;—you see and feel it everywhere; there is no mistaking it.

You see foresight and mass-production thinking applied to production that at present is very small. The demand for rightness in *every* detail that can affect business in *any way*.

* * *

And through it all, everywhere, the new awakening to the fact that, now, too often, the REAL drag on profits, and on success in competition, is the using of WRONG MATERIAL.

In all the New thoroughness, the foundation—the one indispensable factor, is—THINKING IN THE RIGHT MATERIAL.

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What is a Fair Price for Copper In Electrical Products?

Abstracts from an address "Some Economic Aspects of the Copper Industry" by Professor L. C. Graton

IN his address on "Some Economic Aspects of the Copper Industry" before the annual meeting of the Mining and Metallurgical Society of America, Professor L. C. Graton, recognized as an authority on his subject, placed a large share of the blame for the copper industry's ills on the too great spread between the ingot metal price and that which the ultimate consumer is called upon to pay for the fabricated copper in domestic appliances, etc. Inasmuch as Professor Graton singled out the price of electric clothes washers with copper tubs in support of his argument, that part of his remarks bearing directly on this subject will prove of interest to the readers of ELECTRICAL MANUFACTURING.

"It appears probable," said Professor Graton, "that propaganda to stimulate the consumption of copper will not be very effective with those consumers who already are the largest purchasers—surely consumption of copper in the electrical industry will not be changed by magazine advertisements or individual solicitation extolling the merits of that metal. Presumably such propaganda has as its chief objective the man in the street, the individual private consumer, and the fabricator who caters to his needs such as * * * a new electric washing machine. * * * For years I have been taking note of this situation, and many an acquaintance has told me that he would like to install copper for this or that, but was frozen out by the exorbitant prices, and they *were* exorbitant.

"I HAVE priced domestic washing machines, identical in all respects, save that the shell or tub of one is copper and of the other is galvanized iron, and have found a difference of as much as $45 between the two types—and this is no unusual case—$45 for a few pounds of copper, easier to shape and to solder than galvanized iron! Surely it is not surprising that the average buyer, even the one fully aware of the superiority of copper, buys the galvanized iron machine; $45 is too high a price for the difference in value. * * * If the market likely to be reached by advertising propaganda is deemed worth going after at all, that is to say, if the purchases of the individual consumer are worth cultivating, ought not the very first step taken by the copper industry to be the insurance that the finished article is priced to the ultimate buyer at the lowest possible increase over the price of the refined metal? Surely consumption of copper can not be stimulated by lowering the price of the metal if the copper washing machine still remains $45 higher than the galvanized."

In the discussion which followed, Lawrence Addicks, metallurgist, said: "Professor Graton spoke about the excessive cost of the copper washing machine. I don't think that situation is unique for copper. Take an ordinary safety pin. It costs less than one cent. A silver safety pin costs, say 50 cents. A gold safety pin, used for fastening your necktie, costs about $4. If you figure out the metal values there, the proportion is absurd. I think it is due entirely to the magnitude of production."

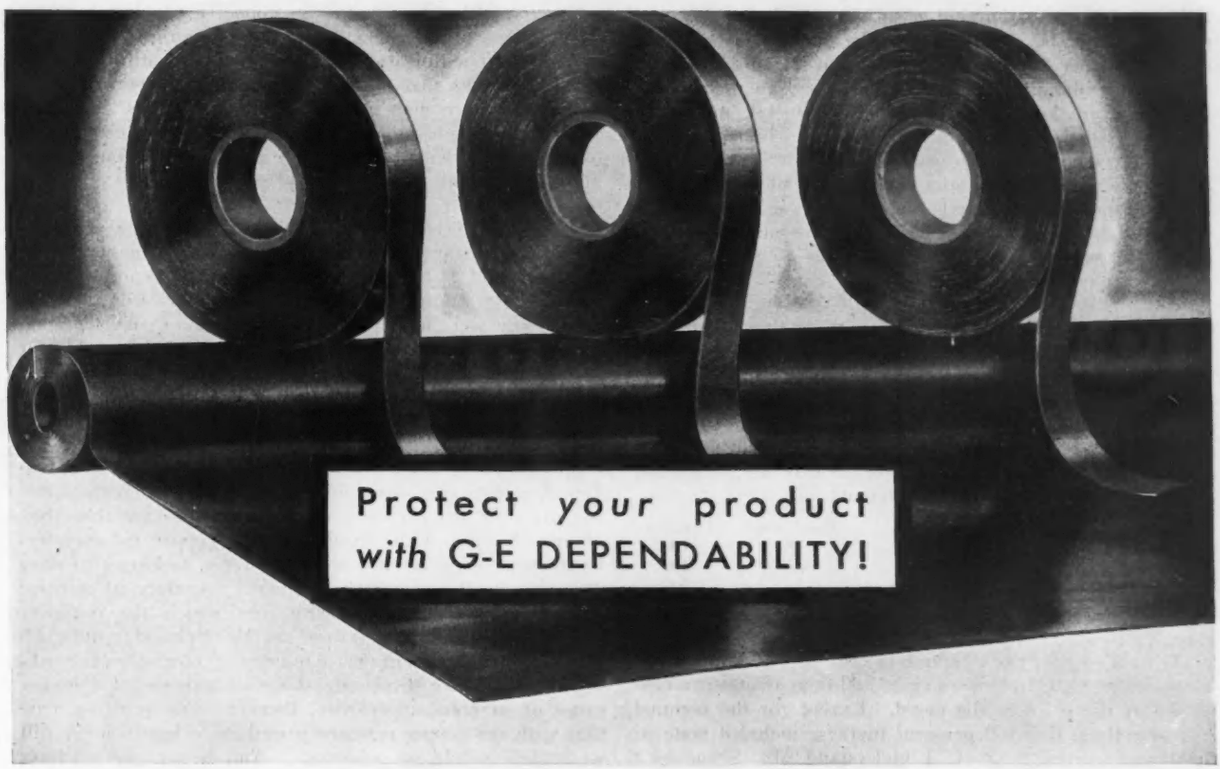
To which Professor Graton replied: "It is true that the two washing machines, identical except for a little difference in metal, are not made differently and priced differently just to be foolish and freakish. It is probably true that a considerable part of that difference, although I cannot imagine like all of it, is due to differences in scale of production of the two types. Why not make more washing machines with copper tubs, if by making more you can make them cheaper and sell them cheaper and thus sell them all? It is no answer to say that they have to sell high because there are not many of them made. I think Mr. Addicks' analogy of the safety pin is all on my side. It is the cheap thing that sells in abundance. Copper products can be made cheap, and the price of the metal does not materially affect that eventual outcome."

And then, Wm. G. Schneider of the Copper and Brass Research Association, took a hand in the discussion on a subject to which he had given much thought.

"I have listened with a great deal of interest to the remarks of Professor Graton," said Mr. Schneider. "This discussion relating to copper washing machines is perhaps more of a basis for general comparison than would appear on the surface. As Professor Graton spoke, I put down some figures just roughly to get at how the actual difference of $45 in favor of iron is made up. To start with, if we assume a washing machine using 50 pounds of metal, the copper in that machine will cost about $14, as compared to $3 for galvanized iron. I am assuming that there is still a considerable tonnage of galvanized iron used for corrosion-resisting parts in washing machines which, however, is not the case.

"SUPPOSE a retail price for a copper machine at $165, and for galvanized iron $120. Let us see how we may account for the $45 difference. The manufacturer's spread between cost of producing and the selling price to jobbers in the case of washing machines is about 30 per cent. The discount to jobbers is 50 per cent from list price, and therefore the spread between the copper and galvanized iron tubs is reduced to $22.50, the price to the jobber of the copper tub machine being $82.50 and that of the galvanized tub $60. Of the $22.50 difference between the price of copper and galvanized iron tub $7 represents the manufacturer's differential between cost of production and selling price. Subtract $7 from $22.50, which leaves in round figures $15 as the extra cost of the copper to the manufacturer. About ten years ago, the percentage of galvanized iron used in washing machines was about 54 per cent of the total. Today copper represents about 50 per cent of the total and galvanized iron 5 per cent."

To which remarks by Mr. Schneider Professor Graton made the following rejoinder: "In the first place, one may express surprise that the average domestic washing machine contains so much as 50 pounds of copper merely in the shell or tub (other copper and brass parts are common to both the copper and the galvanized types and thus not involved in this analyisis) I should have guessed at 25 to 30 pounds as an ample estimate, but I yield to Mr.



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Schneider's information and accept 50 pounds for this comparison. This, he assumes, costs the manufacturer $13.50, or 27 cents per pound—a differential of 9 cents for rolled sheets, thus already a heavy handicap, and an unnecessary increase over the 18-cent price of the metal, unless the purchase is in small quantities. Then Mr. Schneider figures 100 per cent added by the manufacturer for overhead, etc., and another doubling by the time the retailer is satisfied. Thus, he finds the 50 pounds of copper has mounted to $54, while the galvanized iron has similarly become $12. Here is the $42 of the $45 difference I found in price—a substantial agreement and check.

"BUT Mr. Schneider appears to assume that because the difference in price can thus be explained the difference is not only justified, but necessary. It is here that I dissent. The maker of washing machines ought to be able to use enough sheet copper (if he can sell his product cheaply enough) to buy in carload lots and thus pay the minimum differential for rolling. But this is the way Mr. Schneider explains how the score actually mounts:

	Per Pound	Per Cent
Original copper	18	100
Sheets	27	150
Including manufacturer's overhead	54	300
Including jobber's and retailer's overhead	108	600

"That is to say, the original 18-cent copper reaches the consumer at $1.08, or an outright addition of 500 per cent on top of the price of the metal. Except for the nominal cost of rolling, this 500 per cent increase included none of the manufacturing cost—if I understand Mr. Schneider's figures correctly. Can this enormous increase be justified? Can any one maintain that such an increase is economically necessary and sound? Is the copper-producing industry content to see its 18-cent copper priced to the consumer at $1.08? Is it willing to see copper compete with galvanized iron on a basis that makes copper cost the buyer 84 cents per pound more than galvanized iron: $1.08 vs. 24 cents? If any one believes that an 18-cent price for copper chokes off a market that would thrive at 15 or 13 cents, what must he conclude regarding a price of $1.08?

"MR. SCHNEIDER has shown us how metal that cost the manufacturer (on a generous estimate) $13.50 has become a $54 cost to the buyer. It is obvious that if frame, motor, agitator, piping, wringer, fabricating packing and freight were increased in anything like a corresponding ratio over actual cost, the machine as a whole would cost several hundred dollars. Yet, as a matter of fact, the retail price of the copper-shell machine is something like $135 to $160. In other words the copper metal in the tub is made to stand about one-third of the total selling price. Surely the copper is being discriminated against. We are indebted to Mr. Schneider for these interesting, detailed figures. But for my own part, at any rate, it seems to me that they abuntantly sustain the thesis that the copper industry has been overlooking a vital element in not seeking to insure that the metal reaches the ultimate consumer at a price reasonable in consonance with that which the producer himself receives. If it is true, as Mr. Schneider indicates that, despite this enormous handicap of cost, copper washing machines are displacing those of galvanized iron because of inherent superiority, then is it not probably true that with the copper machine priced more legitimately, still wider sale would be achieved? And is not the washing machine merely typical of many other things containing copper?"

When May a Buyer Refuse Shipments of Electrical Equipment?

By LEO T. PARKER
Attorney at Law

GENERALLY speaking, a buyer may refuse to accept a shipment of electrical devices if the seller fails to ship the kind and quantity of goods specified in the contract of sale, or, if the seller fails to deliver the merchandise at the agreed time.

Moreover, in view of the numerous previously decided higher court cases, it is well settled that a purchaser of electrical equipment may legally and without liability cancel any contract of sale obtained by a seller as a result of direct or indirect fraud, misrepresentation, coercion, undue influence, duress, threats, or where the contract is made without proper authority of the purchaser's employee, or while an authorized purchaser is mentally deficient, intoxicated, under influence of drugs, or under legal age.

Also, it is interesting to observe that the courts have consistently held that a purchaser is privileged to cancel an order given a salesman at any time before the seller sends a letter or telegram acknowledging the order. In other words, an order given a salesman for merchandise is merely an offer on the part of the buyer, and a valid contract of sale is not completed until the seller accepts this offer.

Contrary to the opinion of the majority of persons, the legal meaning of "fraud" or "deceit" is widely different from its ordinary dictionary definition. Legally, actionable fraud on the part of a seller means that all of the following facts are proved.

1—There must be conduct—acts, language, or silence—on the part of the seller amounting to a representation or a concealment of material facts from the buyer. 2—These facts must be known to the seller at the time the sale is completed. 3—The truth concerning these facts must be unknown to the purchaser at the time he made the contract. 4—The defrauding acts of the seller must be done with the intention, or at least with the expectation, that the purchaser will be influenced. 5—The conduct or promises of the seller must be relied upon by the purchaser.

Therefore, it is well established that although a seller practices deceit upon the purchaser, the latter has no legal recourse if he did not believe the deceitful actions or fraudulent statements were true.

Still another important point of the law is that a deceitful or misleading statement made after the sale is completed is not actionable deceit.

For example, in a leading case (147 S. E. 87) it was shown that after a purchaser had signed a contract of sale

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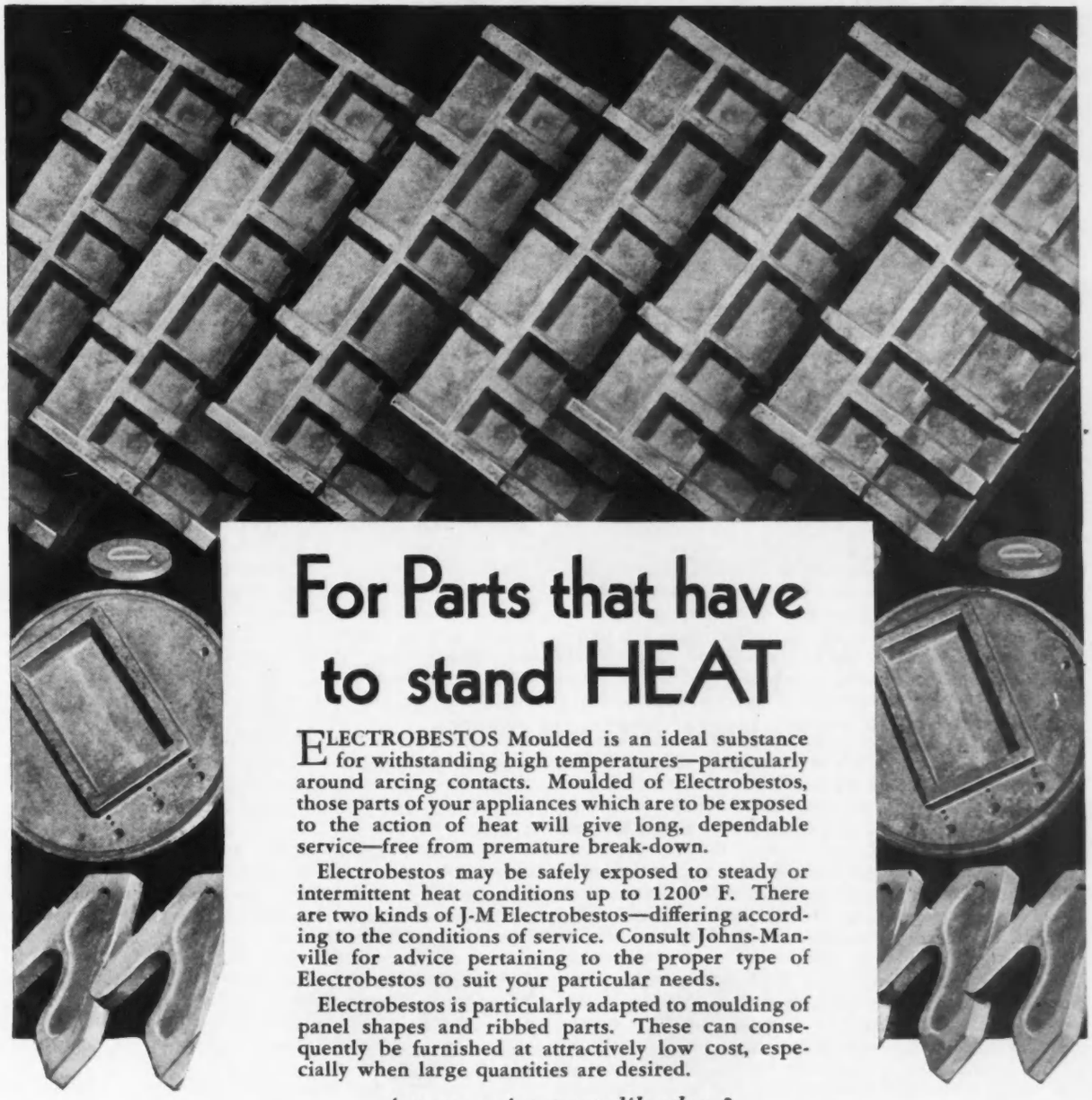

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for electrical equipment the seller stated: "I know that you will be pleased, because this machine is the best quality."

Later the buyer discovered that the quality was very poor, and he sued to recover damages. However, the court refused to hold the seller liable, because the deceiving statement was made after the sale was completed.

And again in the leading case of Sams v. Barnes, 82 S. E. 124, a higher court explained the meaning of the term "fraud," stating:

"FRAUD in the procurement of a contract is where a party intentionally or by design misrepresents material fact or produces a false impression in order to mislead another or to entrap or cheat him or to obtain an undue advantage over him, in every such case there is positive fraud in the truest sense of the term . . . the misrepresentation may be as well by deeds and acts as by words, by artifices to mislead as by positive assertions."

However, the mere failure of a seller to explain facts, not his duty to disclose, does not constitute fraud. Yet where he has reason to believe that his silence misleads the other party or where he purposely conceals material facts, which he knows to be implied deceit, such acts may be an element of fraud. In a recent case (101 Iowa 457), the court said:

"It is the general rule that mere silence of a person in regard to facts which it is not his duty to disclose is not fraudulent. But, where silence would be misleading, a duty to speak may arise."

A common source of controversy is where a buyer of electrical equipment endeavors to cancel a contract contending that he was not fully informed of the contents of the agreement when he signed it. However, it is well established that a contract is not rescindable where it is shown that one of the parties was mistaken with respect to his assumed obligations, unless convincing evidence is introduced to prove that cancellation of the contract is mutually agreeable to both parties.

FOR illustration, in Dixon v. Morgan, 285 S. W. 558, the question before the court was whether a contract should be declared void because a purchaser signed it while mistaken of the contents. This court explained that the general principle of the law, which runs through nearly all of the cases of this character, is that a contract made through mistake of one party will be cancelled only when it can be done without interfering with any legal rights acquired by either party, and without doing injustice to other persons.

Also, in a recent case (298 S. W. 918) the evidence disclosed that a purchaser negligently signed a contract of sale without reading it. Later he discovered that the instrument contained certain stipulations that were not explained to him by the seller. The buyer instituted legal proceedings to cancel the contract contending that he was mistaken of his obligations, and that he was deceived because the seller failed to explain the details of the obligations in the contract. Notwithstanding these contentions the court held the buyer required to fulfill the contract, and said:

"In the absence of fraud, misrepresentation, or concealment, the rule is well established that one who can read and who signs a contract without reading it, and under circumstances which do not preclude an exercise of due diligence upon his part to ascertain the contents of the contract, will not be heard afterward to say that he did not read it and did not understand its provisions."

A very common source of litigation is where the electrical goods shipped does not conform with the contract of sale or the samples displayed when the contract was signed.

It is well settled that a purchaser may always rescind a contract of sale and is not required to accept and pay for electrical supplies if the seller fails to ship goods equal to the samples.

On the other hand, a buyer cannot legally reject merchandise where the complaint is based upon a defect in the merchandise of little or no consequence. (136 S. E. 602). Therefore, the outcome of litigations involving this point of the law often is dependent upon whether or not the complaint is material or of minor importance.

It is important to know that a purchaser who intends to cancel a contract for electrical supplies on any of the legal grounds is bound to act promptly, otherwise he may forfeit the right.

For instance, in the case of Noll v. Baida (254 Pac. 623), it was disclosed that five or six months after purchased goods were delivered, the buyer began to suspect that the seller had made certain false representations to induce the sale. Thereupon, the buyer immediately communicated with the seller who promised to take back the goods and refund the purchase price. The seller failed to fulfill the promise and the buyer delayed about seven months before renewing his demands.

IT is interesting to observe that, although it was proved that the buyer had been influenced to sign the contract by fraudulent representations made by the seller, the court held the purchaser not entitled to a judgment against the seller, saying:

"Before the buyer had a right to maintain an action for rescission of a contract or ultimately to succeed therein, it must at least affirmatively appear that has has acted with the promptness which is demanded by the statute."

Also, it is important to know that it is the legal duty of a buyer to immediately inspect the electrical goods shipped under a contract of sale. If there are any apparent defects and he retains the merchandise after discovering the imperfections, without notifying the seller, he cannot reject the order or defend a suit by the seller for the purchase price on the contention that the goods are not as represented.

If, however, the defects in the merchandise are not readily apparent, the purchaser is not deemed to have legally accepted the goods until sufficient time has expired in which a reasonable and prudent person may have discovered the defects.

Sometimes a contract of sale specifies that an order for electrical supplies shall be shipped in two or more lots. Litigations frequently arise in contracts of this nature when the buyer accepts and pays for the first lot and refuses to accept delivery of future lots.

GENERALLY, the courts have held that the buyer is bound to accept and pay for all of the lots of merchandise, unless it is shown that the quality of the refused goods is not equal to the quality specified in the contract of sale.

However, the fact that a buyer accepts a bad lot of merchandise, does not affect his rights to reject future bad lots. For example, recently, a buyer and a manufacturer entered into a contract by the terms of which the latter agreed to deliver at intervals of 60 days seven lots of merchandise.

The manufacturer made only the first lot and shipped it awaiting response from the buyer before starting production of the other six lots. The buyer promptly accepted and paid for this lot. The manufacturer then began production of the balance of the merchandise. When the second lot was completed and shipment was made the buyer refused to accept delivery contending that the goods did not comply with the quality guaranteed in the contract.

The manufacturer filed suit against the buyer but the latter defended the suit by proving that neither the first nor second lot of shipped goods were equal to the quality specified in the contract.

Molded Parts the Way You Want Them –

THERE probably *are* some disadvantages in the use of molded parts, but you will be a long time in making their acquaintance if you have International molding service.

International molding service meets all your opportunities and problems for you, with the most complete grasp of every molding possibility and requirement. We make your molds, manufacture your inserts, assemble and mold, all in our own extensive plant. One order covers everything. Our estimators are at your disposal without obligation.

PRECISION MOLDERS OF BAKELITE AND OTHER PLASTIC MATERIALS

INTERNATIONAL INSULATING DIVISION

The General Industries Company

ESTABLISHED 1875 · · ELYRIA, OHIO

Motor Selection and Protection

(*Continued from page* 43)

and a time setting, and frequently these two are confused. Properly applied and adjusted, this type of relay gives good motor protection.

The fourth type is the thermal device, which is the latest form of motor protection. Motors driving loads requiring high starting torque, such as on cranes, hoists, rolling tables, etc., must have very large fuses or high settings of relays, which means that short circuit protection only is provided. Further, every motor is capable of carrying a heavy overload for a short period of time and this period is longer than that given by the commercial form of instantaneous or time delay overload relay. If the relay is set high enough to preclude operation on the short time overload the motor can withstand, it leaves the motor without adequate protection in case of a prolonged overload which would not trip the relay, but be sufficient to burn out the motor. As long as a motor performs its duty and does not reach a dangerous temperature, there is no reason for disconnecting it from the line, even if it should be carrying overload for a time. It is evident that a motor which is just starting and is cold can carry an overload for a longer period of time than the same motor could if this overload occurred when the motor was already hot. The commercial form of instantaneous or time delay overload relay cannot control these factors.

The ideal form of relay would be one that follows the thermal characteristics of the motor very closely. Thermocouples in the motor winding meet this requirement very well, but are too expensive except for the larger sizes of machines. The thermal devices just mentioned under the fourth group come nearest to fulfilling these requirements. There are two forms of this relay; non-adjustable and adjustable. A non-adjustable form is the thermal cutout. There are two forms of the adjustable device. The cheaper is one in which the current to the motor flows through a coil, heat from which is radiated to a strip of metal which expands and trips the device. This relay follows the heating of the motor quite closely during ordinary operation. The other form is made of two elements, the one a mass of iron corresponding to the iron in the motor, the other a heating element corresponding to the windings of the motor. The operation of the relay is dependent upon the expansion of a strip of metal which, due to this arrangement, follows the thermal characteristics of the motor closely. These thermal devices are not suitable for short circuit protection but, used in conjunction with fuses in the line, give the best form of protection.

Thermal cutouts are now furnished with a marking indicating the maximum rating of fuse with which they can be used. If the fuses in the line exceed this rating, it is necessary to add a set of fuses which will come within this rating to provide short circuit protection.

Magnetic switches are becoming increasingly popular because of their simplicity of operation and convenience in location. A complete line of these, using the thermal overload devices just mentioned, is now on the market.

The next point to be considered is the selection of wire between the mains and the motor. A squirrel-cage induction motor draws a large current during starting. This current decreases as the motor comes up to full speed, but the decrease is not rapid until the motors have increased in speed to approximately 60 per cent of full load speed. As the fuse or overload relay setting is dependent not only on the current but also on the time, it can be seen that, on a load requiring heavy starting duty, the motor will not accelerate as quickly as one having a light starting duty. Therefore, on the former, the large current will last for a longer period, necessitating a larger fuse than on the same motor handling a load having a slight starting duty. This in turn, means a larger conductor between mains and motor.

Paints and Colors Aid in Increasing Production

(*Continued from page* 48)

jib cranes with modernistic yellow and black stripes. They stand out so prominently against the white shop background, there is little chance of the overhead crane operator not seeing them, and butting the jib crane or its operator with a heavy load. In like manner his crane hook is painted yellow, so it will always attract the attention of the workman on the floor.

At Westinghouse jib cranes are painted white with the caption "The capacity of this crane is ——— lbs." painted across the beam in large black letters, thus killing two birds with one stone—increasing visibility and warning against overloading.

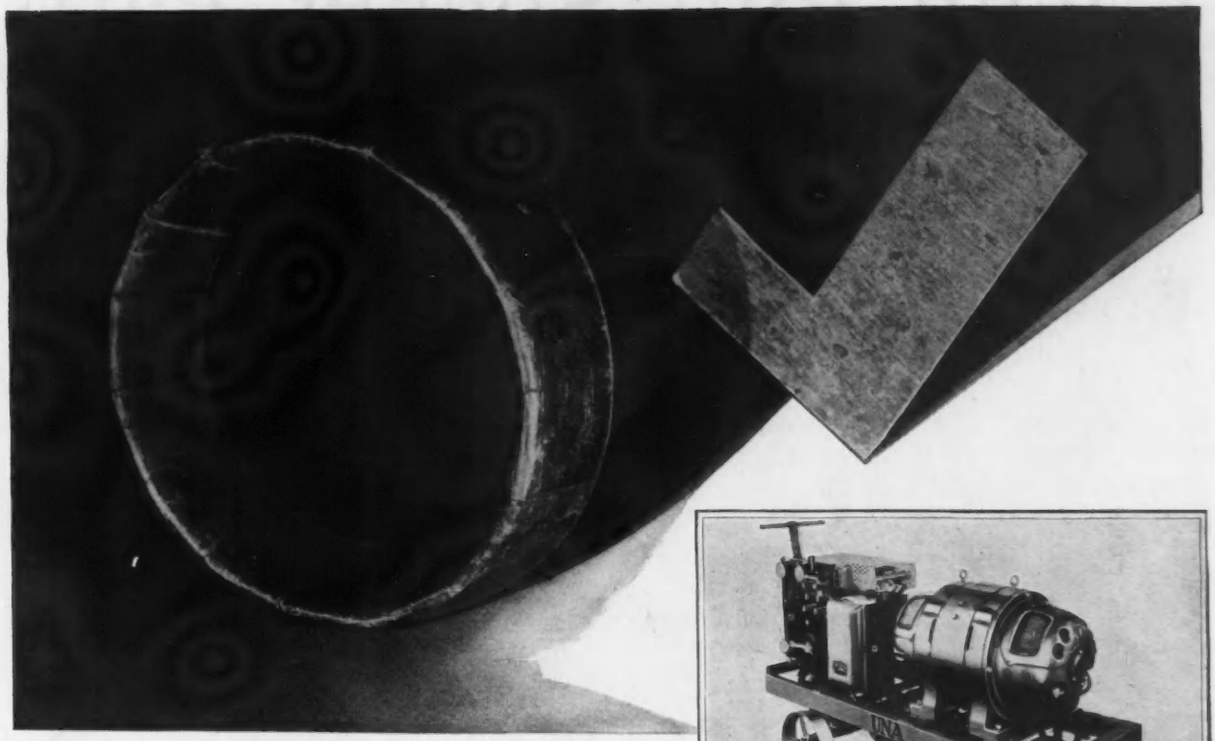
Crane carriages and handrails are painted yellow, exposed shafting is painted red, yellow or white. While red immediately signifies danger, under smoky, oily and other excessively dirty conditions, prevalent at overhead crane height, it loses its visibility much quicker than yellow or white.

Conveyor systems which pass over aisles and work benches need heavy wire guards beneath. These are painted white to harmonize with the surroundings, or yellow or red, to give a startling effect, so necessary in some kinds of safety devices, to afford a full measure of protection.

Floor markings to keep aisles clear; signs and placards, especially danger and voltage warnings, and safety slogans are everywhere. Black and white, yellow and maroon, black and yellow, green and yellow are some of the background and lettering combinations that have high visibility.

Cleanliness, as it affects the workman's health, is a distinct safety factor. A large Mid-Western plant is not satisfied with white corners on stairways to decrease promiscuous expectoration. They continue the white line along the entire baseboard, throughout the plant, with good results. One of the chief values of painting benches and machinery is the good effect it has on the effort to keep them clean. White and light tint paints breed cleanliness.

High voltage testing stations and apparatus are painted gray in one plant. Switch gear, etc., is red—even the floor around it is painted red to warn everyone. Fire apparatus, chemical extinguishers, control stations, pipe lines, etc., are always red. Here the psychological value of color is important. Red paint not only distinguishes this equipment in case of necessity, but is a constant reminder of the danger of fire, at all times.



"Better Arc Welders are made with Super Micanite"

HERE insulation is one of the most vital factors in performance. Only the best will do. That's why Una Arc Welder commutators are insulated with Super-Micanite.

Super-Micanite contributes unfailingly to the results for which the machine is designed and built. Higher dielectric strength . . . greater surface resistivity . . . the absence of injurious decomposition products, and the fact that Super-Micanite does not carbonize makes it unique among built-up mica insulations.

If you have never tried Super-Micanite send for a sample. Subject it to the most rigorous tests. Then we feel certain you will agree that it is the outstanding electric insulation of its kind.

MICA INSULATOR COMPANY

New York: 200 Varick St. Chicago: 542 So. Dearborn St.
Cleveland Pittsburgh Cincinnati San Francisco Seattle
Birmingham Los Angeles Montreal and Toronto, Canada
Works: Schenectady, N. Y. London, England

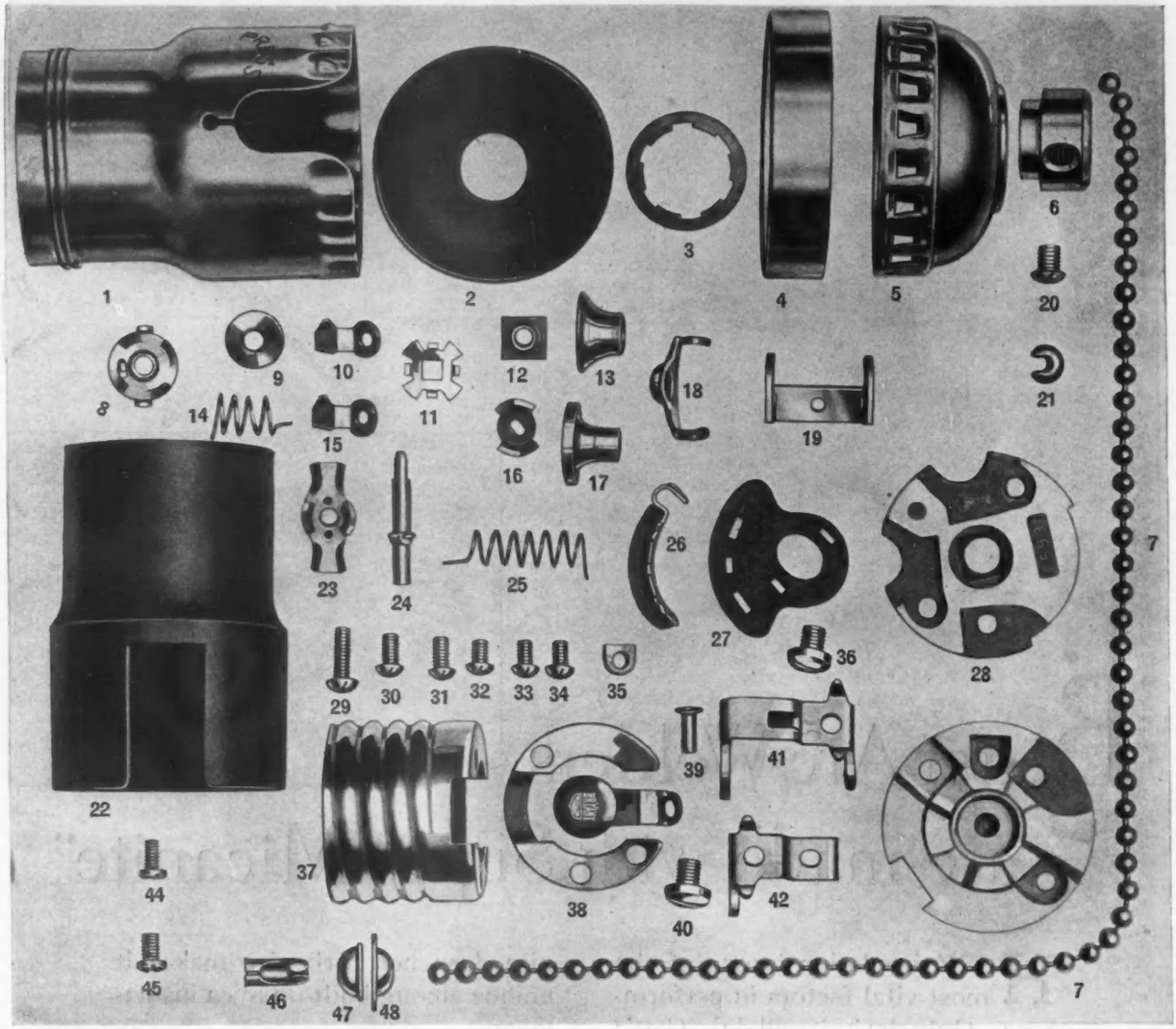
PERFECT MICANITE INSULATOR
REG. U.S. PAT. OFF.

Electrical INSULATION

PERFECT EMPIRE INSULATOR
REG. U.S. PAT. OFF

MICA INSULATION OILED CLOTH INSULATION

Chain Pull Socket Parts



ELECTRICAL MANUFACTURING *acknowledges the assistance of the Bryant Electric Company, Bridgeport, Conn., in the preparation of the above illustration and the compilation of the accompanying table of chain pull socket components. The illustration shows the principal parts of a typical pull socket, while the table shows the different materials entering into its construction*

Table of Parts and Raw Materials Used in Chain Pull Sockets

Part No.	Title	Material	Part No.	Title	Material
1	Socket shell	Brass	22	Shell lining	Paper
2	Paper cap lining	Paper	23	Commutator	Brass
3	Washer	Steel	24	Center post	Steel
4	Ring	Brass	25	Spring	Steel
5	Cap	Brass	26	Chain rail	Steel
6	Cap bushing	Brass	27	Chain rail plate	Fibre
7	Bead chain	Brass	28	Top button	Porcelain
8	Ratchet	Steel	29-35 Incl.	Screws	Steel and Brass
9	Washer	Steel	36	Brass beading screw	Brass
10	Contact	Brass	37	Screw shell	Gilding metal
11	Crown piece	Steel	38	Retaining ring	Brass
12	Washer	Steel	39	Eyelet	Gilding metal
13	Bell mouth	Brass	40	Beading screw	Brass
14	Spring	Steel	41	Terminal	Brass
15	Terminal	Brass	42	Terminal	Brass
16	Cam	Steel	43	Ratchet button	Porcelain
17	Eyelet	Brass	44	Screw	Brass
18	Bell mouth bracket	Brass	45	Screw	Brass
19	Bracket	Steel	46	Chain sleeve	Brass
20	Screw	Steel	47 and 48	Pendant	Brass
21	Stop ball	Brass			

SPECIAL PORCELAINS by "THOMAS"

LARGE cumbersome designs hold no terrors for *Thomas.* Special porcelains . . . large or small . . . dry or wet processes . . . can be produced here to the most exacting specifications . . . on short notice.

Thomas Engineers **have expert knowledge of their profession . . . all based on a background embracing 50 odd years' experience in the ceramic processing industry.**

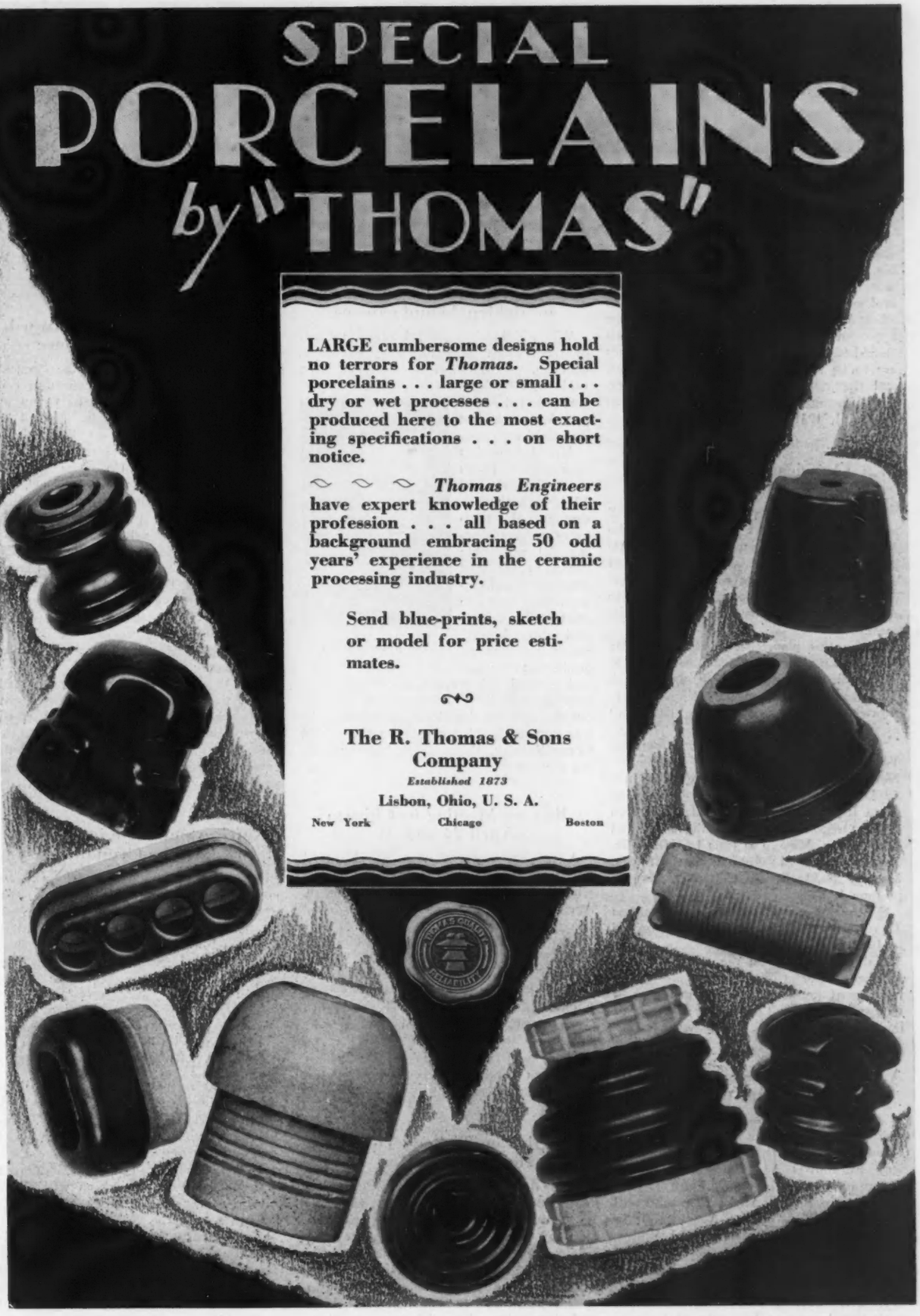
Send blue-prints, sketch or model for price estimates.

The R. Thomas & Sons Company

Established 1873

Lisbon, Ohio, U. S. A.

New York Chicago Boston



Simplified Practice Adopted by Electric Saw Industry

A simplification program covering the shapes and sizes of arbor holes for portable electric circular saws and grinding wheels was unanimously approved at a general conference of the industry on March 20, at Washington. It was decided that the approved shape of hole for grinding wheels should be round, while for saws the shapes are to be round or round with flat sides, and the size to be 1¼ in. in diameter. This recommendation is to be effective as of Jan. 1, 1931.

Certificate Plan Rates for R. M. A. Meeting

Special convention railroad rates will apply for all members attending the Radio Manufacturers Association meetings at Atlantic City, June 2-6. A reduced rate of one and one-half fare under the certificate plan will be granted, these rates to apply also to dependent members of the family.

Under this plan, tickets at the regular one-way fare for the going journey are to be obtained between May 29 and June 4, inclusive, except from the following territories, for which the selling dates are as follows:

Trans-Continental Passenger Association Territory—Colorado, except Julesburg; New Mexico, Wyoming, May 28 to June 3; Montana, Southern Idaho, Utah, May 27 to June 2; Arizona, Nevada, Northern Idaho, Oregon (except via California), and Washington, May 26 to June 1; California, May 25 to May 31; Oregon, via California, May 24 to 30; British Columbia, May 26 to June 1.

Southwestern Passenger Association Territory—Oklahoma and Texas, May 28 to June 3.

Half-fare tickets on the return journey will be contingent on the attendance at the meeting of not less than 150 members of the organization and dependent members of their families.

A. S. A. Adds Ainsworth, McNair and Darling to Staff

The appointments of Cyril Ainsworth, John Wilson McNair and Clarence Edward Darling to the staff of the American Standards Association have been announced recently by William J. Serrill, president. Mr. Ainsworth, who will direct the work of the Association in the establishment of national codes, was formerly director of the Bureau of Industrial Standards of the Pennsylvania Department of Labor and Industry. Mr. McNair had been associated with the American Institute of Electrical Engineers in its standards department; while Mr. Darling comes to the Association from the staff of the American Society of Mechanical Engineers.

Jacobs Named Vice-President of Belden Manufacturing

Whipple Jacobs, general sales manager of the Belden Manufacturing Company, Chicago, manufacturer of electrical wire, cable and cordage, was elected vice-president at the last directors' meeting.

Whipple Jacobs

Mr. Jacobs has been connected with the company since 1914, with the exception of two years overseas during the war. He began in the cost department and successively rose to chief inspector, general store keeper, purchasing agent, production manager and general sales manager. Due to his experience in both the manufacturing and buying ends of the electrical business, he was commissioned a captain in the Signal Corps Reserve, Procurement Section, during the war.

Battery Meeting in Chicago April 24 and 25

A two-day convention of the National Battery Manufacturers Association is scheduled for the Sherman Hotel, Chicago, April 24 and 25. Among the subjects listed for speakers are:

"What Is the Battery Dealer Thinking About?" by Harry G. Moock of Moock, Lewis & Ballard; "Current Problems in Merchandising," by J. O. McKenzie of J. O. McKenzie & Co.; "Lower Insurance Costs," by George F. Brown of George F. Brown Co.

There will also be several discussions of modern trends in materials used by the battery manufacturer.

Gleason-Tiebout Host to Lighting Men

The Gleason-Tiebout Glass Company, New York, was host to a hundred members and guests of the New York Section of the Illuminating Engineering Society, on March 13th. The occasion included a tour of the Maspeth Plant, with accompanying guides to explain the steps in the manufacture of glass, including the glass blowing section. After inspection, dinner was served at a nearby restaurant, followed by the presentation of a paper on "Recent Developments in Glass Manufacturing," by Dr. Alexander Silverman. D. W. Atwater, chairman, presided.

Harvard Advertising Award Goes to Westinghouse

The Harvard Award, for the "general or institutional advertising campaign conspicuous for the excellence of its planning and execution," established by Edward W. Bok, late philanthropist of Philadelphia, has been presented to Westinghouse Electric & Manufacturing Co. The award, a certificate and a cash prize of $2,000, was the first given to a national institutional advertising campaign in newspapers since the founding of the award in 1923.

The presentation was made by Dean Wallace B. Donham of the Harvard Graduate School of Business Administration to J. C. McQuiston, general advertising manager of the Westinghouse company, and to A. L. Billingsley, president of Fuller & Smith, Cleveland, advertising agency for Westinghouse.

The Westinghouse advertisements adjudged the best consisted of a series of twenty which told in simple terms of the service electricity is rendering to the world. They were "institutionalized" by citing the important contributions made by Westinghouse in expanding the uses of electricity.

Refrigerator Activity Pushed by Grigsby-Grunow Co.

Following the announcement in January by the Grigsby-Grunow Company that it intended to enter the electric refrigeration field, comes the news that a total of 303,000 sq. ft. of floor space has been added for this branch of the business. Production is likely to begin the second week in May.

Hammond Clock Purchases Additional Space

To make room for further development and expansion, Hammond Clock Company, 4115 Ravenswood Ave., Chicago, has purchased a four story and basement factory building, at a cost estimated at $300,000. The total floor area exceeds 80,000 sq. ft., which will allow for the increasing number of production units.

The company has also purchased additional ground space, adjoining the new building, which will permit the erection of another structure that will increase the total floor space to 250,000 sq. ft. Offices are now being built in

★Chromalox Ring Units, Single or 3-heat, 2½" to 11" diameter, 110 or 220 volts. Used by leading makers of Electric Ranges, Waffle Bakers, Coffee Urns, Percolators, Sandwich Toasters, Incubators, Brooders, Infra-Red Ray Lamps, Health Baths, Melting Pots, Etc. Write for Bulletin C-106

Make your products *trouble-free* . . . . . from the start

Over 173 far-sighted manufacturers are doing it. Tests and experiments soon showed that it's more economical all around to equip products with patented Chromalox heating units.

IT'S like building an automobile . . . or a fine watch. The motor, the works, the insides must be right or it won't go. You are making appliances. Fine looking . . . latest designs . . . destined to be best-sellers.

The most important part of your product is out of sight

But what about the heating units that are out of sight and yet responsible for the every day successful operation of that waffle baker or electric range or water heater? Are they going to deliver the right heat everytime the switch is turned on?

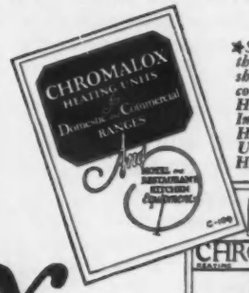
Not a single burn-out in 5 years

That report just comes from an ironing machine manufacturer. It's his five-year experience with Chromalox heaters. Other companies report similar satisfactory operating records. Your own products can be made just as trouble-free by using these patented Chromalox units.

Start now to make your products trouble-free

Customers call us in to show them the right way to build in the heating units. Result, assembly costs are lowered, trouble is side-tracked. Whether you are working on a new product or improving an old one, tell us about the appliances or heating devices you want properly heated. There's no obligation!

EDWIN L. WIEGAND CO.
7530 Thomas Blvd., . Pittsburgh, Pa.



★*Send for your copy of these 8-page bulletins showing the largest complete line of Strip Heaters, Ring Units, Immersion Heaters, High-Speed Range Units and Special Heaters.*

Chromalox
ELECTRIC HEATING UNITS

the new building, following which the company will move to its new address, 2911 N. Western Ave., Chicago

J. R. Replogle Heads Copeland Engineering Department

John R. Replogle, veteran electric refrigeration engineer and well known for his perfecting of many parts, systems and methods now employed in the industry, has been named chief engineer of Copeland Products, Inc., Mount Clemens, Mich. Mr. Replogle formerly was chief engineer and one of the organizers of Nizer Corporation, merged about 1926 with Kelvinator, and developer of the Nizer compressor. He remained with Kelvinator until 1928.

J. R. Replogle

In 1919-1920 Mr. Replogle was chief engineer of Frigidaire, and previously was with Remy Electric and General Motors laboratories and Western Electric in engineering and research capacities.

Steinite Manufacturing Elects Six to Board

The election of six directors to the board of the Steinite Manufacturing Company, Fort Wayne, Ind., has been announced, the new members being: M. B. Wiley, Du Pont de Nemours, Wilmington; Oscar Holmgren, Bakelite Corporation, New York; H. D. Simpson, Anaconda Wire & Cable Company, Chicago; Charles F. Anderson, National Surety Company, Chicago; P. D. Berry, American Rolling Mills Company, Middleton, and P. D. Rensenhouse, General Cable Corporation, Fort Wayne.

Revere Copper and Brass Wins Advertising Award

Revere Copper & Brass, Inc., New York, has received the Harvard award for the advertisement published in 1929 most distinguished for its effective use of typography. The advertisement honored was entitled "The Smoke Marks Paul Revere's Foundry," and was one of a series of six which traced the company's history from the time of Paul Revere, noted patriot and founder of the copper and brass industry in America, to the present day Revere organization.

Rattan Manufacturing Buys Handy-Andy Line

The Rattan Manufacturing Company of New Haven, Conn., manufacturer of conduit fittings and solderless wire connectors. has purchased the stock and good will of the East Haven Specialty Company, manufacturer of the Handy-Andy Snap-On garage and portable utility lights. The new lines will be handles by the Rattan sales agents, Hatheway & Company, New York.

Hanson-Van Winkle-Munning Buys A. P. Munning & Co.

The purchase by Hanson-Van Winkle-Munning Company, Matawan, N. J., manufacturer of buffing and electroplating equipment and supplies, of A. P. Munning & Company, Matawan, manufacturer of kindred equipment, has been consummated and the two companies will be consolidated. Van Winkle Todd will be president of the consolidated company.

Carter Appoints H. A. Simmons Sales Manager

H. A. Simmons has been appointed sales manager of the Carter Radio Company, manufacturer of components for radio set manufacturers, 407 S. Aberdeen St., Chicago. Mr. Simmons was formerly sales engineer in Chicago for the International Resistance Company, Sprague Specialty Company and Amperite Corporation.

Nathaniel Baldwin Plans Line of Radio Receivers

Plans for the new line of radio receivers to be manufactured by Nathaniel Baldwin, Inc., 1601 South Michigan Ave., Chicago, will be announced within the next few weeks, according to a statement by C. H. Callies, advertising director.

N. Baldwin

The radio sets which will bear the name of Nathaniel Baldwin, inventor and manufacturer, will supplement the firm's lines of loud speakers and remote control units. As a professor of physics in one of Utah's colleges, Mr. Baldwin was one of the pioneers in radio research. Associated with Mr. Baldwin in this venture is Fred Marchev, general sales manager. He and Mr. Callies were formerly identified with the Temple Corporation.

Engineering Advance Traced at A. S. M. E. Anniversary

The progress of merchanical engineering during the last fifty years was described by Dr. Harvey N. Davis, president of Stevens Institute of Technology, over a national radio network on March 30, as part of the golden anniversary of the American Society of Mechanical Engineers. The society celebration itself was held April 5, 7, 8 and 9 in New York, Washington and Hoboken, N. J.

Brevities

National Carbon Company, Inc., New York, has announced the following personnel changes: C. E. Anderson, formerly manager of the Kansas City branch, has been named manager of the Eveready Prestone and Miniature Lamp Division; located in the New York office, 30 E. Forty-second St.; W. H. Halle, who formerly held this position, has been named manager at Kansas City; D. G. Raymond, manager of the Eastern Division, has been appointed manager of the Central Division, office at 230 N. Michigan Blvd., Chicago; J. M. Spangler, formerly in this post, replaces Mr. Raymond in the East, with headquarters in New York; Walter A. Jacobs, formerly with the Department of Commerce Bureau of Standards, has joined National Carbon's general sales division.

Dubilier Condenser Corporation, 342 Madison Ave., New York, has appointed as general sales manager N. S. Tobey. A graduate of Annapolis, Mr. Tobey served in the navy until 1922. He was engaged in steamship operation for the next five years, following which he joined the sales staff of Marion Steam Shovel Company, Marion, Ohio. He resigned as Eastern manager for that company to join the Dubilier organization.

Crosley Radio Corporation, Cincinnati, has appointed Frank G. Macomber as director of radio sales. Mr. Macomber was treasurer and general manager of Stern and Company, Hartford, Conn.

Norge Corporation is now located in new quarters at 12001 East Jefferson Street, Detroit, Mich. A. M. Tayler, formerly with Copeland Products, has been appointed advertising manager.

Silent Automatic Corporation has moved to new quarters at 12001 East Jefferson St., Detroit, Mich.

Walker Dishwasher Corporation, Syracuse, N. Y., has become a subsidiary of General Electric Company. Walker will continue to operate as an independent business, under the same management, with no changes in general policy.

Electro-Kold Corporation, Spokane, Wash., has announced the election of Edwin S. Matthews as president, succeeding Dr. X. L. Anthony, deceased.

Conduo Base Company, Cleveland, has moved to a new location in the Hanna Building, Cleveland.

Grumble Electric Company has moved from 10 West State St., Alliance, Ohio, to 2306 Third Street, S.E., Alliance.

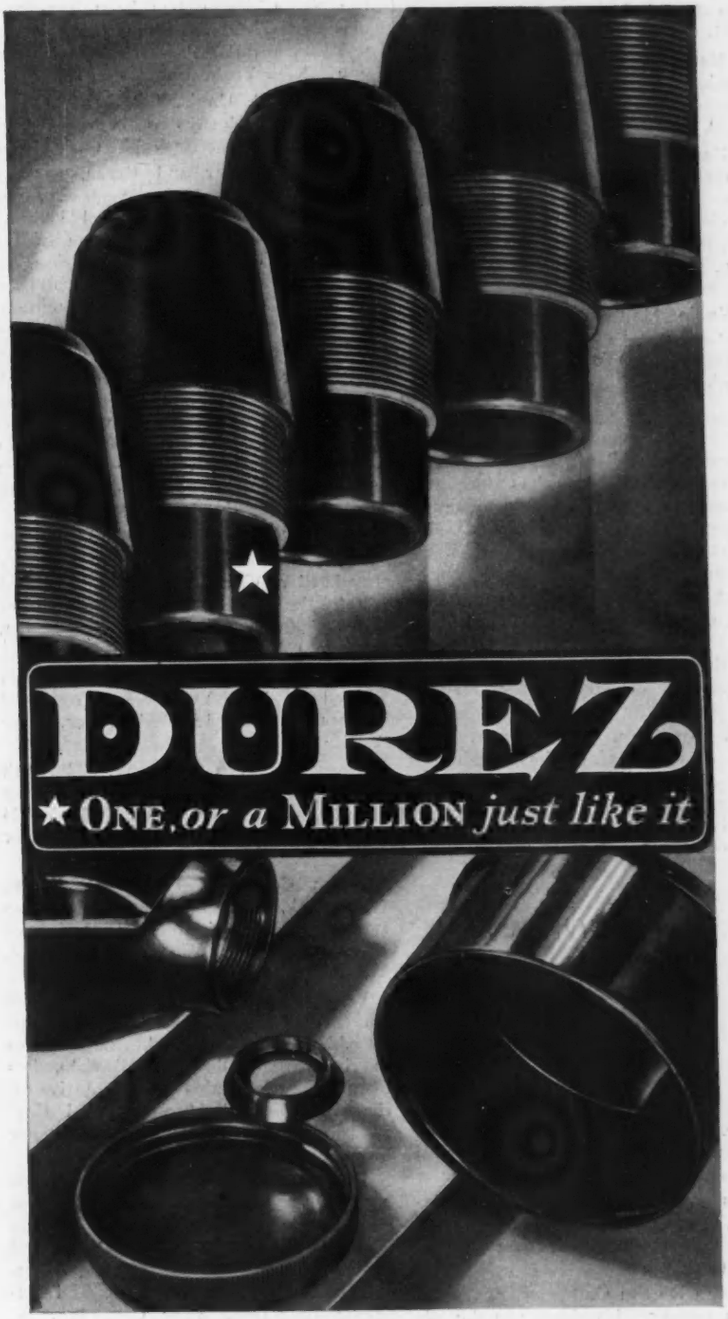
Hammond Machinery Builders, Inc., is the new name of the former Hill-Curtis Company, Kalamazoo, Mich.

Young Brothers Company, Detroit, Mich., has added the following to its engineering staff: D. E. Anderson in the Boston office; P. A. Meyer in the Detroit main office; G. C. Becher in the Buffalo office; and J. J. Ferris in the New York office.

Horolectrical Corporation, 316 W. 14th St., New York, which enters the field of horological and electrical precision instrument manufacture, lists in its personnel Arthur Dorsey, inventor, as president and chief engineer; Charles S. Miller, who has been connected with

You know the quality of threads you want

. . . let DUREZ produce them for you



YOU'RE FAMILIAR with Durez because you've seen some of its countless uses. Perhaps you don't realize that many manufacturers have chosen this molding compound for just one reason. It insures perfect threads!

And that applies to any kind or size of thread! Whether you require very fine threads . . . short bayonet threads for readily removed box covers . . . sturdy threading of insulated parts . . . wear-resisting threads on jar tops, bottles and collapsible tubes—*wherever* you use it, Durez assures accuracy within the closest commercial limits.

Durez threads are molded, not cut—though they can be drilled or tapped without splitting or chipping. That means exact duplication whether you produce one or a million parts. Durez is hard, strong, tough. That means threads will not strip. They'll fit tightly. Seat easily. Reseal without jamming. Contents of the container will not cake, leak or discolor.

Durez has other advantages. Production is economical, for parts come from the mold *finished!* . . . quickly and easily fused. Durez is acid and alkaline resistant. Moisture, heat, gas, oil resistant. And Durez comes in all practical colors and combinations.

No matter what material you're using now, you owe it to yourself to learn more about Durez. It makes perfect threads, yes. But it will do more than that. Durez makes a perfect part—from the standpoints of efficiency, beauty and durability! We're sure of that. We'd like to tell you why. Write to General Plastics, Inc., 49 E. Walck Road, North Tonawanda, N. Y. Also New York, Chicago, Los Angeles, San Francisco.

Write for this new, free booklet, "Do It With Durez." Illustrated, it contains complete information about Durez . . . physical and dielectric properties, color ranges, and scores of possible applications.

the clock business for over 25 years, as vice-president and general manager; and Robert S. Mapletoft, secretary and production engineer.

Copperweld Steel Company, Glassport, Pa., announces that C. H. Jensen, formerly with the Pittsburgh branch of Byllesby Engineering and Management Corporation, has joined the Copperweld organization's engineering staff.

Reliance Electric & Engineering Company, Cleveland, Ohio, has appointed C. Brigham Allen as direct sales representative of the Philadelphia office.

G. R. Strauss and C. L. Violet announce the opening of their new business as manufacturers of resinoid parts, at 7535 Santa Monica Blvd., Hollywood, Cal.

Ohio Electric Manufacturing Company is the new name for Ohio Electric & Controller Company, 5900 Maurice Ave., Cleveland, manufacturer of lifting magnets and small motors.

Stanley Electric Tool Company, subsidiary of the Stanley Works, New Britain, Conn., has purchased the trade name, stock, etc., of the Unishear Company, New York City, and will continue manufacture at the main plant in New Britain, Conn.

Electrad, Inc., has added to its engineering staff Harry H. Horning, formerly associated with the Cutler Hammer Manufacturing Company of Milwaukee, and the Philadelphia & Reading Coal and Iron Company of Pottsville, Pa.; and E. J. Hughes, formerly with Splitdorf Electrical Company and the Brandes Products Corporation, both of Newark, N. J.

Akron Copeland Company, Akron, Ohio, is now located at 227 West Exchange Street, Akron.

Copperweld Steel Company, Glassport, Pa., has recently added Edwin N. Hazlett to its engineering department. Mr. Hazlett had been connected with the Duquesne Light Company, McKeesport, Pa.

Robbins and Myers Sales, Inc., Springfield, Ohio, has promoted R. F. Marshall of the advertising department to the position of advertising manager; and Ralph W. Wheeler has been appointed sales manager of the automatic devices division.

Proctor and Schwartz Electric Company is now located in new quarters at Seventh and Tabor Road, Philadelphia, Pa.

L. S. Brach Manufacturing Corporation, Newark, N. J., has leased for a long term a two-story and basement factory at 51-63 Dickerson St., Newark, where it will locate in the near future. The company recently sold the railway signal device division of its business and is now concentrating on a line of electrical devices, clocks and radio accessories.

Bakelite Corporation, Bloomfield, N. J., is erecting an addition to its present plant which will increase its floor space one-third. The new building will house the research and development department.

Coming Conventions

American Institute of Electrical Engineers.—District meeting at Springfield, Mass., May 7-10.

American Oil Burner Association.—Annual meeting at Chicago, April 7-12.

National Battery Manufacturers Association.—Hotel Sherman, Chicago, April 24 and 25.

National Electric Light Association.—Annual convention, San Francisco, Cal., week of June 16, 1930.

National Electrical Manufacturers Association.—Spring meeting at The Homestead, Hot Springs, Va., May 18-23. Annual meeting at Old Point Comfort, Va., in October. (Exact date will be announced later.)

Radio Manufacturers Association.—Annual convention and exhibition, at Atlantic City, N. J., week of June 2, 1930.

Connecticut Telephone and Electric Corporation, of Meriden, has announced the promotion of Josef O. Cadieux to the position of chief engineer. Mr. Cadieux has been associated with the company for many years.

Waukegan Chemical Company, North Chicago, Ill., announces a change of name to the Brevolite Lacquer Company, the old name being discarded as no longer descriptive of the business or location.

Silex Company, subsidiary of Wolcott, Inc., of Hartford, has announced the appointment of William G. Church, Jr., as sales manager. Mr. Church was formerly associated with the Beardsley & Wolcott Manufacturing Company.

Branch Offices and Agencies

Thomas W. Butler, 3270 Columbus Avenue, Detroit, has been appointed representative of the Penn Electrical Company for the State of Michigan.

Leeds & Northrup Company, Philadelphia, has announced a change of address of its Cleveland office to 1941 Union Trust Building.

Scranton Button Company, Scranton, Pa., has announced a change in the address of its Detroit office to 145 Eastlawn Avenue, Detroit.

Simplex Wire & Cable Company, Boston, Mass., has announced the opening of a branch office in the Fidelity-Philadelphia Trust Building, Philadelphia, Pa., under the management of Elden L. Howe.

A. G. Werner, 4030 Chouteau Avenue, St. Louis, Mo., representative in the St. Louis district of Wadsworth Electric & Manufacturing Company, Chicago Moulded Products Corporation, and Brandywine Fibre Products Corporation, would like to secure accounts salable to the electrical manufacturers and larger industrial plants among whom he has close contact.

Fred Garner & Company, 126 N. Clinton St., Chicago, has been appointed manufacturer's agent in the Chicago territory for the Pacent Electric Company, New York.

Stanley R. Davis, 140 South Drexel Ave., Detroit, desires to become Detroit agent for an electric kitchen ventilator.

Revere Copper and Brass, Inc., of New York, announces the opening of a Philadelphia sales office at 123 South Broad St., under the direction of the Baltimore Copper Mills Division, of which George Griffault is manager. David Hickman, former Cincinnati representative of the Rome Brass and Copper Co., will be assistant manager.

Wagner Electric Corporation, St. Louis, Mo., has announced the transfer of P. Loyd Lewis from the managership of the Kansas City branch office to the home sales office, where he has been placed in charge of the merchandising division.

Roller-Smith Company, 233 Broadway, New York, has appointed Henry L. Muller Company, First National Bank Building, Pittsburgh, as direct sales agent in western Pennsylvania, eastern Ohio and West Virginia.

Dumore Company, Racine, Wis., has moved its New York office from 407 Broom St. to 9-15 Park Place, New York.

Despatch Oven Company, 622 Ninth St., Minneapolis, has named as district sales representative, L. H. Endrick, 424 Book Building, Detroit. He will cover Michigan.

Usem Company, 515 W. 29th St., New York, has named as district sales representatives, Thomas W. Butler, of Detroit, and Fred W. Carlson, Seattle, Wash.

William G. Harvey Company, 540 First Trust and Deposit Building, Syracuse, N. Y., and with additional offices in the Crosby Building, Buffalo, has been appointed sales representative of the Consolidated Machine Tool Corporation, in the Buffalo and Syracuse territories.

Allied Electrical Sales Company, New York, has been named to represent Quadrangle Manufacturing Company of Chicago, Hoosick Falls Radio and Electrical Parts Manufacturing Company, Hoosick Falls, N. Y., and Superior Insulating Tape Company, St. Louis, Mo.

Prehler Brothers, Inc., 1514 Prospect Avenue, Cleveland, Ohio, have been appointed Cleveland representatives of Irvington Varnish & Insulator Company, Irvington, N. J.

George H. Diers, 2514 McMicken Avenue, Cincinnati, has been appointed

.....Call on MONOWATT

for your eyelets, ferrules and rivets. We make them to your specifications in Copper, Brass, Guilding Metal, Allegheny Metal, Steel and Aluminum.

The variety of metal parts illustrated here gives an idea of the Monowatt manufacturing service at your disposal. Please remember that Monowatt offers you capacity for millions — delivered on time — at low cost.

Keep the Monowatt Electric Corporation on your list of suppliers of custom metal parts — also of molded insulation parts.

THE MONOWATT ELECTRIC CORPORATION
24 WEST 40th STREET, NEW YORK, N. Y.
427 WEST RANDOLPH STREET, CHICAGO
Factories: Bridgeport and Meriden, Conn. - Sales Offices: New York and Chicago

MONOWATT *for greatest value*

sales representative in the Cincinnati territory for the complete line of the Modern Tool Works, division of the Consolidated Machine Tool Corporation of Rochester, N. Y.

Obituaries

William J. Longmore, consulting purchasing agent for Westinghouse Electric & Manufacturing Company, succumbed to pneumonia, March 4, at his home in Bellevue, Pa. He had been connected with the Westinghouse company since 1886 and has been identified with the purchasing department during the past fifty years. He was perhaps the longest in continuous service of any man in the employ of the company.

W. J. Longmore

Mr. Longmore was born in Old Allegheny, now Pittsburgh, and moved to Bellevue when a boy. In 1881 he entered the employ of the Union Switch & Signal Company. When Mr. Westinghonse organized the electric company, he entered the services of the new corporation as a painter and carpenter. With the development of the company, Mr. Longmore was made storekeeper, which department he organized and formed on a large scale to cope with the rapid growth of the company's business. He remained in that position until 1892, when he was appointed purchasing agent. In 1928 he received the title of Consulting Supervisor of Purchases, which position he held at the time of his death.

Manufacturers' Literature

ELECTRICAL MANUFACTURING *presents a digest of recently issued catalogs, bulletins and other advertising material. Manufacturers are invited to send literature for review in this column.*

Penn Union Electric Corporation, Erie, Pa. Circular announcing a new high copper non-corrosive alloy for Penn-Union solderless connectors. Illustrated.

Benjamin Electric Manufacturing Company, Des Plaines, Ill. Bulletin entitled, "Lighting Equipment for Airports, Airport Hangars, Landing Fields and Airways."

Udylite Process Company, Detroit, Mich. A 32 page exposition of the theory and practice of electrolytic application of cadmium. Illustrated.

United Radio Manufacturing Company, New York, offers a 4 page leaflet describing radio builder and experimenter needs.

Seeger Refrigerator Company, St. Paul, Minn. Illustrated folders describing the Seeger line of residence cabinets.

General Electric Company, Schenectady, N. Y. Pamphlet of 8 pages describing the manufacture of wire and cable.

Reliance Electric & Engineering Company, Cleveland, Ohio, offers a 15 page pamphlet descriptive of Type AA Reliance induction motors with ball bearings. Illustrated.

Financial

Birtman Electric

Birtman Electric Company has reported a net profit of $316,061 for 1929, which compares with a net profit of $288,603 for the preceding year.

Eisler Electric

Eisler Electric Corporation of Newark, N. J., has reported a net profit for 1929 of $1,046,231, or $5.23 a share. This compares with $200,498, or $1 a share in 1928.

Eureka Vacuum Cleaner

Net sales to customers and dealers of the Eureka Vacuum Cleaner Company, Detroit, totalled $10,804,602 for the year ended Dec. 31, 1929. This compares with net sales of $10,099,713 for the preceding year. Net income for 1929 was reported at $1,269,207, as compared with $867,727 for 1928.

Johns-Manville

Johns-Manville Corporation, New York, and subsidiary companies, manufacturers of asbestos and magnesia products, report a net profit for 1929 of $6,591,916. This compares with $5,589,398 in 1928.

Maytag Co.

Maytag Company, Newton, Iowa, has reported for 1929 net profits of $6,838,884, or $3.33 a share. These earnings were the highest in the twenty-seven years of the company, and compare with $5,336,710 in 1928, or $2.39 a share.

Manning, Bowman

Manning, Bowman & Company, Meriden, Conn., reports a net profit of $173,396, equivalent to $1.21 a share for 1929, which compares with $204,162 net income in the preceding year, or $1.60 a share.

For the Man Who Keeps Your Lists

Because the following manufacturers are now either out of business or have discontinued making an electrical product, we have removed their names from our lists:

Dwyer Machine Co., Lynn, Mass.

McClellan Refrigerating Co., East Chicago, Ind.

Smith Home Appliances, Inc., Syracuse, N. Y.

Firm Name or Address Changes:

Preferred Oil Burners, Inc. Name changed to Hart Oil Burner Corp., 2200 N. Adams, Peoria, Ill.

Hill-Curtis Co. Name changed to Hammond Machinery Builders, Kalamazoo, Mich.

Cooper-Hewitt Electric Co., 410 Eighth Ave., Hoboken, N. J. Taken over by General Electric Vapor Lamp Co.

Victor X-Ray Corp. Name changed to General Electric X-Ray Corp., 2012 W. Jackson Blvd., Chicago, Ill.

Walker Dishwashing Corp. Name changed to Walker Dish Washing Corp. Div. of General Electric Co., 246 Walton, Syracuse, N. Y.

DeForest Radio Co., Jersey City, N. J. Address changed to Passaic, N. J.

All-American Mohawk Corp., Chicago, Ill. Address changed to North Tonawanda, N. Y.

General Kontroler Co. Taken over by Leland Electric Co., Dayton, Ohio.

The following manufacturers have been added to our lists either because they are new concerns or old companies which are now making some electrical product:

Portable Electric Tool Corp., 67 Walnut, Fitchburg, Mass.

Chase Mfg. Co., 3216 Morgan, St. Louis, Mo. (Industrial heaters and electric vulcanizers)

Miami Cabinet Co., 1700 Grant, Middletown, Ohio. (Illuminated cabinets and closets)

Detroit Reproducers, Inc., Lafayette and Meldrum, Detroit, Mich. (Loud speakers)

Gast Mfg. Corp., Bridgman, Mich. (Paint spraying outfits)

Sharpe Mfg. Co., 1356 S. Flower, Los Angeles, Cal. (Paint spraying outfits)

F. L. Rogers & Co., 25 S. Jefferson, Chicago, Ill. (Electric saws)

A. J. Kollman, 213 East 55th, New York. (Paint sprayers)

Circolite & Lamp Corp., 56 W. 45th, New York. (Fixtures and portables)

Webb Electric Mfg. Co., 2498 Kingston Rd., Cleveland, Ohio. (Portable lamps)

World Bestos Corp., Paterson, N. J. (Lamp filaments and radio tubes)

Gauger Mfg. Co., 1507 Fifth, Milwaukee, Wis. (Thermostats)

New motor repair shops that have come to our attention and so have been added to our lists:

F. W. Rathmer Electric Co., 371 Upton Ave., Battle Creek, Mich.

L. P. Cedarholm, Alturas, Cal.

Weir & Weir, 609 S. Main, Burlington, Iowa.

Watt G. Hughes, 1217 S. Zunis Ave., Tulsa, Okla.

Valley Armature & Electrical Co., 710 Broadway, Fresno, Cal.

Information Wanted

We have been asked for the names and addresses of manufacturers of the articles listed herewith.

Replies from our readers to any of these inquiries will be greatly appreciated by the Information Bureau of ELECTRICAL MANUFACTURING, 461 Eighth Ave., New York City.

"L R Co" Receptacles.
"Aspinall" Soldering Fluid.
"Burrows" Therapeutic Lamp.
"Williams" Commutator Dressing.
"Flint" Waffle Iron.
"Hillcrest" Line of Lighting Fixtures.
"Defiance" Cigarette Lighter.
"Pioneer" House Pumps.
"Indulet" Fittings.
"Thermodyne" Therapeutic Lamp.
"Autochauffe" Heater for Bakery Ovens.
"Wilson" Box Supports.
"Red Line" or "Red Lion" Conduit Fittings.
"Raylite" Automobile Lamp Bulbs.
"Waverly" Test Clip.

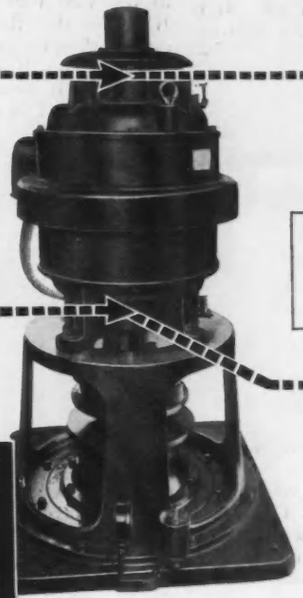
Gurney Ball Bearings

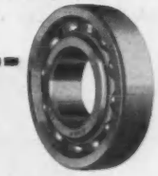
won these positions by Actual Service Results...

Here

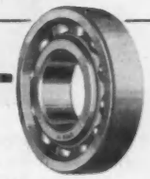
and

Here





GENERAL ELECTRIC TYPE K T. 75 H. P., 2200 VOLT VERTICAL MOTOR DRIVING DEEP WELL PUMP GURNEY BALL BEARINGS USED AS ROTOR SUPPORTS.



1. EXCEPTIONAL THRUST CAPACITY

2. CONTINUOUS SERVICE WITHOUT WEAR

3. MINIMUM MAINTENANCE EXPENSE

In the Vertical Electric Motor a type of bearing must be used that combines extraordinary thrust capacity with substantial radial load carrying ability. Such a bearing is the Gurney Radio-thrust.

In Vertical Motor service this Bearing out-performs all others . . . . carrying the suspended weight of the armature . . . . maintaining original precision and rigidity . . . . performing faultlessly with neither wear nor need for adjustment.

The accuracy and wear resistance that Gurney has manufactured into its Radio-thrust Bearings, extends to other Gurney types as well. Equal success can be had with Gurney Ball Bearings in all types of electric motors, whether vertical — horizontal — vehicular — or the heavy duty Mill and Railroad types.

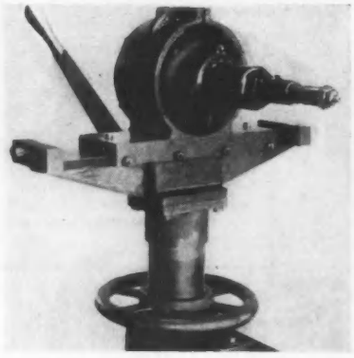
GURNEY BALL BEARING DIVISION
Marlin-Rockwell Corporation
JAMESTOWN, N. Y.

GURNEY BALL BEARINGS

New Goods for Your Inspection

Lathe Type Commutator Undercutter

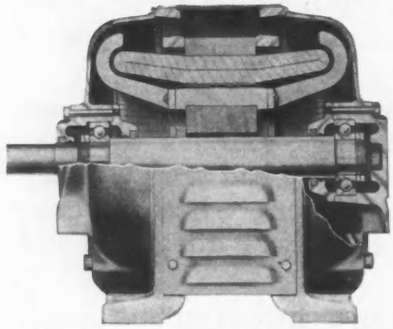
Martindale Electric Co., 1260 W. Fourth St., Cleveland, is manufacturing a motor-driven commutator undercutter intended for attachment to the cross-slides of lathes to be used for undercutting motor commutators in new and repair work. It is adjustable to different diameters of commutators and is directly driven without complications of belts or pulleys. It may be had with either 110 or 220 volts A. C. motors and 115 or 230 volts D. C. motors. Shipping weight is 175 lb. Two types of saws may be had with the undercutter, making it possible for use in undercutting any standard type of commutator.



Uniclosed Motor

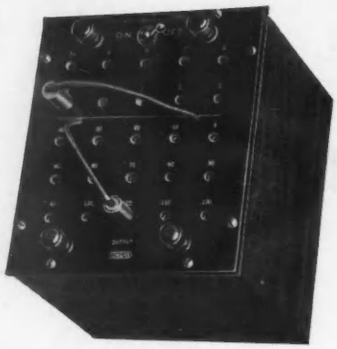
U. S. Electrical Mfg. Co. 200 E. Slauson Ave., Los Angeles, announces an electric motor designated as the Uniclosed type having dual-fan, dual-exhaust. It provides a closed or covered motor in which the windings, rotor, stator, bearings and shaft are competely housed within the frame, thereby protecting them from such extraneous substances as water, dirt and grit.

Air circulation is distributed by two fans located individually at either end of the revolving rotor. These draw in cool air through louvres on both bearing brackets. Each fan creates an air stream centering at the middle of the fan where the heated air is expelled through dual exhaust louvres. This downstream of heated air is outside of the laminated stator core. In these motors the pressed steel cover of the frame is removable for inspection and cleaning of interior parts.



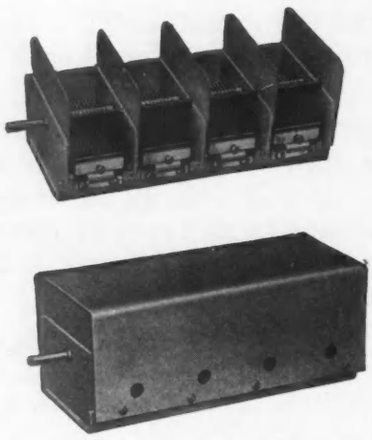
Testing Transformer

Dongan Electric Mfg. Co., Detroit, Mich., recently developed a variable voltage testing transformer. The transformer enables a manufacturer or electrical laboratory to definitely fix upon any voltage within a range of from one to 150 volts, in steps of one volt, with an input of 115 volts. It is said that this instrument eliminates guesswork in designing electrical apparatus, and facilitates the determination of proper voltages. The instrument is provided with two plugs and 25 outlets. One plug controls the voltage in one-volt graduations, and the other permits 10-volt graduations. The current capacity is 5 amp. at any voltage. All connections are designed to eliminate the possibility of accidental short circuits and shocks. The transformer is mounted in a polished walnut case with an engraved bakelite panel and weighs 14½ lb. It is made for either 60 cycles or 25 cycles.



Shielded Condenser

United Scientific Laboratories, 113 - 4th Ave., New York City., announces a shielded condenser type S.G. It has completely shielded stators protruding beyond the grid ends. In addition, it is fitted with individual grounded roto-wipe phosphor bronze contacts and an extra heavy steel frame inforced by section separators. Three brass bearings, including center bearings, are line reamed to insure smooth action. The bosses are arranged so that the condenser can be mounted on either its bottom or side.



A Direct Reading Resistance Meter

Jewell Electrical Instrument Co., 1650 Walnut St., Chicago, announces a direct reading resistance meter which gives direct reading of resistance values in ohms when used in connection with a dry battery.

The Pattern 135 Ohmmeter, as this instrument is called, has a combination voltage and resistance scale. In the lower values of the resistance scale a division is provided every ten ohms. This instrument is furnished with a flange for mounting in a box or on a panel, and is available in a number of ranges for use with both 3 and 4½ volt dry batteries. The 4½ volt instrument is designed especially for use with radio set analyzers, since this voltage is commonly used with them.

Wire Stripper

Henry Carlander, 508 W. 146th St., New York City, has placed on the market a foot pedal operated device for stripping insulating materials or covering from wires up to 12 ga. and stranded wire up to ⅜ in. outside diameter.

An adjustable stop gage fixes the length of the stripped end, and the stripping jaws are adjustable to accommodate various sizes and kinds of wire. The device is portable and easily mounted on a bench or other suitable location.

Photo-Electric Cell and Amplifier Unit

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., is marketing a photo-electric cell with an amplifier unit. The photo-electric cell, often called the "electric eye," is a light-sensitive device. When light falls upon it, voltage having been applied to the cathode, a current passes by means of electron emission from the cathode to the anode. This current is very small, but, when amplified, operates commercial relays.

CHROMIUM
HAS THE CALL!

Beauty and practicality...every woman wants these qualities in her home equipment... and chromium gives them to her. Chromium brightens the house and lightens the housework! It never needs polishing...its rich brilliance is never dulled by time or use. That's why chromium plated merchandise has the call.

United Chromium, Inc., renders a valuable licensing service which assures manufacturers of the finest chromium plate on a definite production basis. We would be glad to explain this service...or, if your needs do not warrant your own plating department, to send you a list of our jobbing licensees.

UNITED CHROMIUM
INCORPORATED

Executive Office: 51 East 42nd Street, New York City

Chicago, Ill. ◆ *Cleveland, O.*

Detroit, Mich. ◆ *San Francisco, Calif.* ◆ *Waterbury, Conn.*

The amplified unit consists of a die-cast aluminum box in which are mounted the necessary coupling devices. The top, which is a Micarta panel, is provided with two four-prong bases for mounting the photo-electric cell and the amplifier tube. All of the wiring is concealed, connections being made to binding posts on the top panel. The unit is dust-proof and moisture-proof. The short connections in the unit make possible a very high speed response—between 0.0001 and 0.001 seconds.

Although four prongs are supplied in the photo cell, for mounting in a standard four-prong base, only two are connected—the anode and cathode prongs. The cathode plate or cell window, which is coated with

Caesium, the light sensitive material, faces the two large prongs.

Industrial engineers and experimenters find this device applicable to such applications as sorting materials, according to color, size, and shape; counting items, where mass production requires speed; initiating operations, such as ringing an alarm on a paper machine when a break occurs in the paper; lighting control, for turning on and off artificial lights according to the intensity of the natural light; position indicator, for showing positions of doors, moving cars, etc.; light intensity meter, for measuring intensity of light for photography; scanning material, to detect flaws or defects; ultra-violet ray meter, for recording the intensity of ultra-violet light; instrument for ascertaining fog height, used with a captive balloon in determining fog height necessary for safe aeroplane height.

Corwico Super Braidite

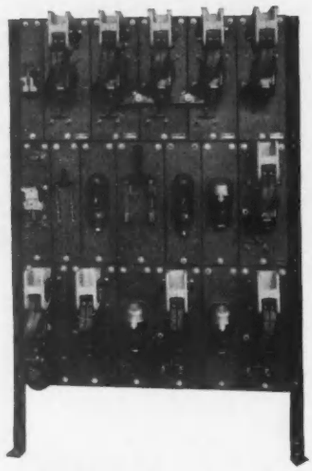
Cornish Wire Co., 30 Church St., New York City, announce a hook-up wire known as Corwico Super Braidite.

In tests, Super Braidite was shown to have an average voltage breakdown of 1340 volts.

Super Braidite can be readily stripped back with any automatic stripper, and the neat appearing, glossy, flame-proof insulation does not bunch up nor fray when pushed back. It is made with a solid or stranded core in 15 different color combinations.

Dynamic Braking Controller

Electric Controller & Mfg. Co. 2700 E. 79th St., Cleveland, announces a dynamic braking controller for crane hoists. It is of the magnetic contactor type and is intended for use on crane, ore and coal bridge, and bucket hoists. It is stated

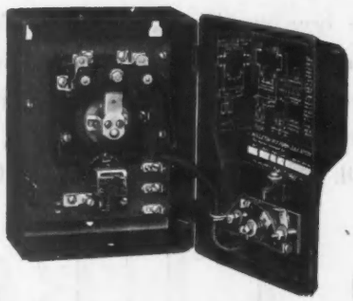


that one of the features of the new device is faster speed when lowering light loads or the empty hook; greater power return to the line when lowering overhauling loads; lower heating on the motor; less contactor wear, and fewer movements when inching for accurate stopping of load.

Starting Switch for Single Phase Motors

The Allen-Bradley Company, 286 Greenfield Ave., Milwaukee, Wis., announce the Bulletin 707 Single Phase Starting Switch for motors operating refrigerating machines, compressors, pumps, oil burners and other motor-driven devices governed by either two-wire or three-wire control.

It is a double-pole magnetic switch with thermal overload relay and has a maximum rating of 1½ hp., 110 volts, and 3 hp., 220 volts. A feature of this starting switch is the operating coil, which has a



double winding for series-parallel connections permitting the switch to be used interchangeably up to and including 1½ hp. for 110 or 220 volt motors by changing the terminal connections of the operating coil. This increases the flexibility of the switch and reduces the number of switches to be carried in stock to meet normal requirements. It can be furnished with start and stop push buttons in the cover, without push buttons, and with two-way lever switch.

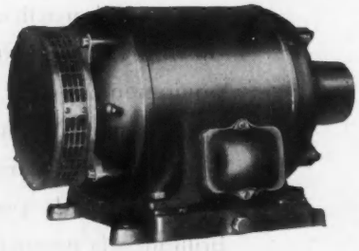
Coil Winding Machine

E. R. Seifert, 135 E. Washington St., Syracuse, N. Y., is manufacturing an automatic coil-winding machine that winds coils of any predetermined number of turns. After the coil is completed the machine stops and locks in proper position. When the coil is cut and ejected, a new coil is started automatically. The machine is

adaptable for forming generator armature or field coils. It is rigidly constructed and equipped with low-friction ball bearings, and the gears and clutch mechanism are immersed in oil.

Totally Enclosed Fan-Cooled Motor

Century Electrical Co., 1806 Pine St., St. Louis, has placed on the market a line of totally enclosed fan-cooled, squirrel-cage induction motors, and in most ratings these motors have the size advantages of open-rated motors. They provide full protection to the stator, rotor and other internal parts, all of which are isolated from outside air. The motor is completely enclosed by ribbed cast-iron coil guards having all fits machined. This construction



prevents dust and dirt from entering the windings of the motor, even though present in abnormal quantities.

The fan and its housing are mounted externally on the front end of the motor, opposite the pulley. Cooling air is drawn in at the pulley end, circulated around and over the rear coil guard, the air passages between the field core and the frame, and thence out over the coil guard on the front, where it is discharged into the atmosphere through the fan and fan housing.

Electric Ovens

Freas Thermo-Electric Co., Irvington, N. J., is manufacturing for research control, industrial purposes, and laboratory tests a line of controlled-heat electric ovens having horizontal flow, forced-air circulation. They are intended for baking and

SERVICEABILITY of HANDY SILVER SOLDERS Illustrated by an Emergency Repair Job

"HANDY" SILVER SOLDERS

1. Are quickly applied
2. Make strong joints
3. Are electrically correct
4. Withstand relatively high operating temperatures
5. Are preferable to base-metal welding and brazing materials

A LARGE electrical manufacturing company had one of their 1440 h.p., 2300 volt, 514 r.p.m., three-phase synchronous motors go back on them. In re-assembling the motor, after making necessary repairs, they struck a snag in brazing the 112 copper cross bars to the hard drawn copper retainer rings. All kinds of brazing materials were tried, without success. A hurry call to our Providence Plant brought a quantity of "Handy" "ATT" silver solder, which did the trick so speedily and well that the engineers of this company have adopted silver brazing as standard practice for similar jobs throughout their system.

Suggesting, naturally, that service departments of motor-building concerns, and repair departments of electric power plants keep on hand a stock of "Handy" Silver Solders of suitable forms and fineness for emergency repairs.

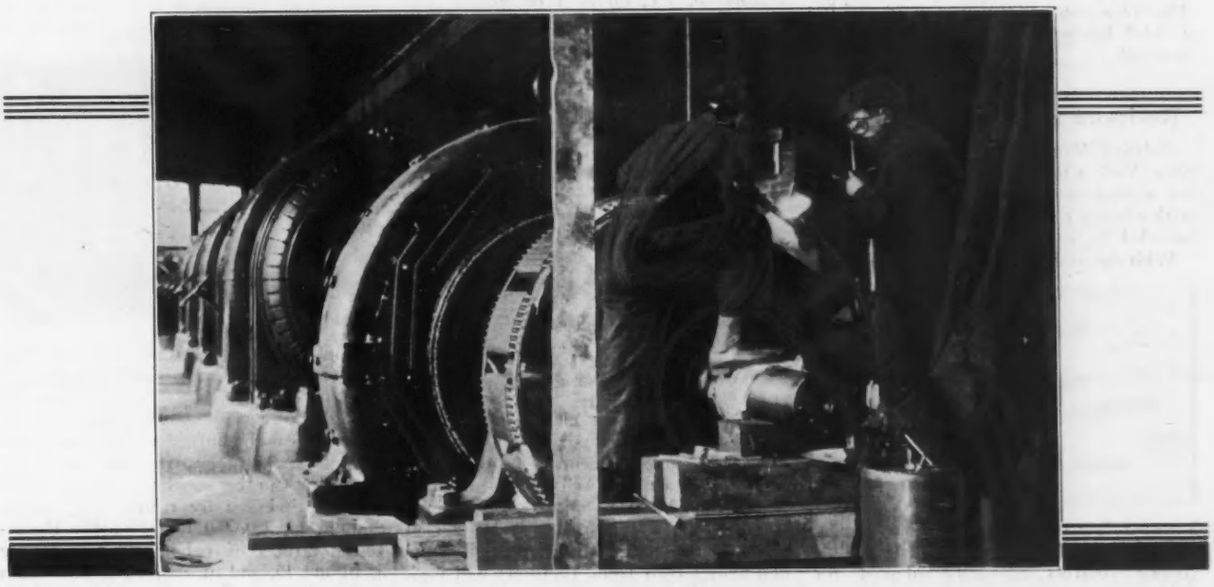
"Handy" Silver Solders are offered, in the form of rod, wire, sheets, strips and filings, in each of twelve compositions, ranging from 10% silver up to 80%, and in melting temperature from 1325 deg. down to 1600 deg. Fahr.

Send for our new Bulletin No. 3E, our "Handy Book of Silver Solder" and other useful literature

HANDY & HARMAN

Executive Offices: 57 William St., New York

PLANTS: Bridgeport, Conn Providence, R. I. Fulton and Gold Sts., New York City



drying operations where it is desired to maintain accurate and uniform heating conditions in all parts of the oven chamber.

The framework is welded structural steel and the ovens have double walls of high thermal resistivity which thoroughly insulate the chamber against outside temperature variations. Heating elements are nickel-chromium alloy of the low-temperature-gradient type. The ovens are equipped with a thermo-regulator of the differen-

tial linear expansion type, which automatically maintains a uniform temperature.

A motor-driven centrifugal fan provides for agitation and propulsion of the air. Air from the operating chamber is drawn through the side walls into a heating compartment, where it meets the electric heaters and incoming fresh dry air, the two being heated and drawn into the duct system and thence passing over the top of the operating space. These ovens are equipped with suitable shelves and racks.

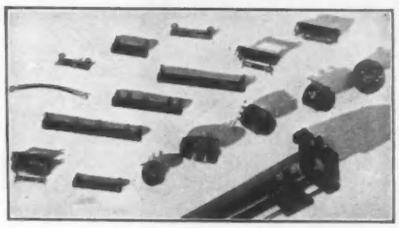
Universal Condenser

The Sevison Magneto Engineering Co., 377-397 Phillips Ave., Toledo, announce a slight change in design of the case of their universal ignition condenser that will mean quite a reduction in cost. The new condenser has a capacity of 0.3 mf., a little higher than the average, thus minimizing contact arcing, and is so constructed as to be readily adaptable to all ignition systems. The brass casing is moisture proof and has a solid bracket. A 10-in. lead wire is attached.

Resistors and Volume Control

Polymet Mfg. Corp., 829 E. 134th St., New York City, has placed on the market a wire-wound tubular resistor treated with a heavy coating of Bakelite compound intended to withstand high temperatures.

With the resistors this company is mar-



keting a line of carbons and wire-wound volume controls, including certain dual volume controls especially adapted for radio purposes.

Indicating Frequency Meter

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., announces a Type SY frequency meter that permits the production of instruments having a scale range of plus or minus 2 cycles for 60-cycle work, with operating torques at least equal to those used in corresponding voltmeters, and with a freedom from temperature or voltage error effects.

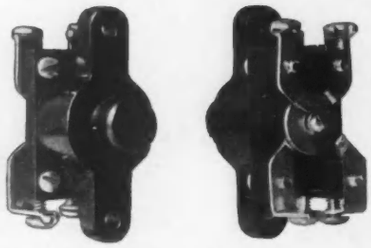
The Type SY instruments differ from the usual resonance type of ratio instruments in that a single resonant circuit of the parallel type is employed, which results

in a very low volt-ampere burden. The circuit design is such that the change of resistance of the reactors and coils due to temperature variations produces no effect whatever. The indication depends only on the values of inductive and capacitative reactance. Thus the temperature effect is so small that it can hardly be measured. The use of a special type of condenser is partly responsible for this performance.

The ranges obtainable are from 54 to 66 cycles or from 58 to 62 cycles for use on 60-cycle systems. The narrow range scales are supplied for use on interconnected systems and are applied principally to power or load dispatching.

Pushbutton Units

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., offers a pushbutton unit for use with machine tools, elevators, conveyors, and in other applications where a control station is desired as a built-in unit. The manufacturer states that the unit is compact and easy to mount. Wiring is facilitated by the fact that the units are



mounted on the cover plate. These units are so designed that they may be conveniently grouped on control stations. The frame on which the mechanism is mounted is of black Micarta. The operating button of the unit can be furnished either in black or red. The accompanying illustration shows both front (bottom) and back view (top).

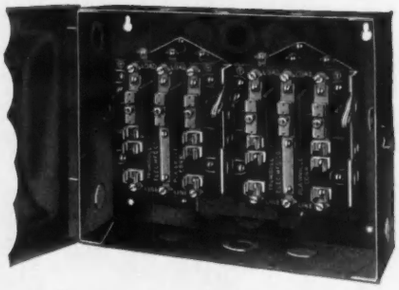
Small Motor Overload Switch

Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee, Wis., has introduced a free tripping thermal overload switch for fractional horsepower motors. This switch provides protection against motor burnouts due to overloads, prevents blown fuses and other electrical troubles caused by overloads. Pushbuttons furnish convenient starting and stopping control. The switch has a time limit type of thermal overload which is furnished in numerous ratings up

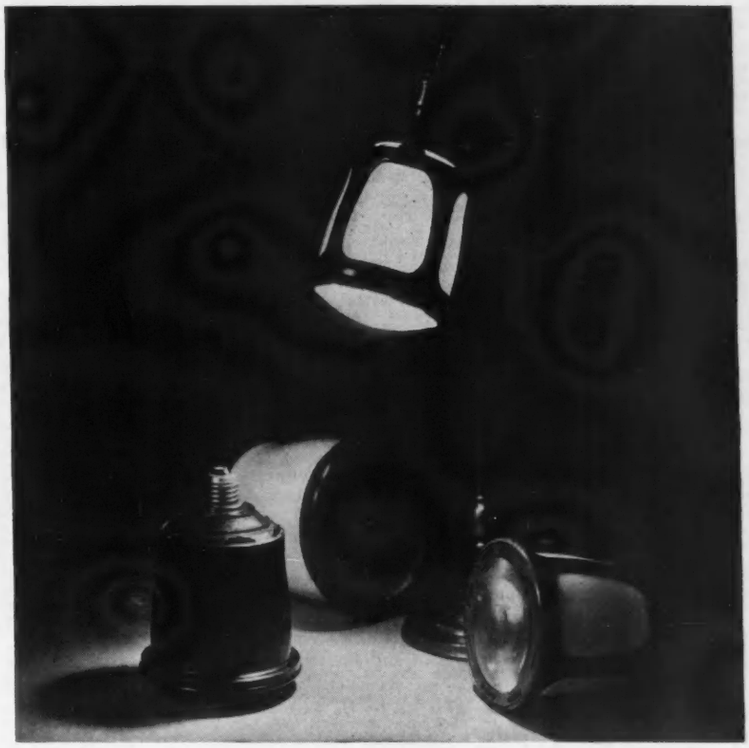
to and including ¾ hp., 110 and 220 volts A.C., and ¼ hp., 115 volts D.C. When an overload trips the switch, it is re-set by pressing the start button, which also restarts the motor. If the overload condition persists, the motor will not start. This switch is intended for use with industrial and domestic appliances and tools, including such equipment as washing machines, refrigerators, grinders, polishers, oil burners, etc.

Magnetic Motor Starters

Trumbull Elec. Mfg. Co., Plainville, Conn., offers a line of Magnetic motor switches No. 81421, two phase, four wire, with overload and under voltage protection. This line consists of two standard magnetic switches mounted in one cabinet



and interlocked electrically so that they operate together as one switch, making a neat and compact 4-wire switch. Two relays are required with each switch. Switches can be furnished with hand reset relays. Switches for use on 50 or 40 cycles can be supplied without extra charge. Switches are available for operation on 115, 230, 460 and 575 volts. Horsepower ratings of polyphase switches are 5, 10 and 15, and of single phase switches 3, 5 and 7½. Shipping weight is 28 lb.



Brady Daylite Adapters molded of Bakelite. Made by Brady Manufacturing Co., Detroit, Mich.

PRICE BARRIER TO RESIDENTIAL MARKET

overcome by BAKELITE MOLDED

For years, Daylite Adapters have been used by the medical profession. These scientific lighting units are needed in every electrically lighted home—but high cost barred them out. Only a price that the average man could afford would open the limitless residential market.

Over a period of six years many materials were tried and discarded by the makers of the Daylite Adapter. Step by step the search narrowed down to Bakelite Molded, as the only material possessing all required properties, and one that could be formed within the cost limit set.

Until recently the lowest price for a Daylite Adapter was forty dollars. Through using Bakelite Molded the design and appearance were improved, the number of parts reduced and assembly greatly simplified. Now Adapters with Bakelite Molded shells are priced as low as six dollars, and the price barrier to the enormous residential market has been removed.

Bakelite Engineering Service—Intimate knowledge of thousands of varied applications of Bakelite Materials combined with twenty years' experience in the development of phenol resinoids for electrical uses provides a valuable background for the cooperation offered by our engineers and research laboratories . . . . . Write for booklet 52M, "Bakelite Molded".

BAKELITE CORPORATION, 247 Park Avenue, New York. CHICAGO OFFICE, 635 West 22nd Street
BAKELITE CORPORATION OF CANADA, LIMITED, 163 Dufferin Street, Toronto, Ontario

BAKELITE

REGISTERED U. S. PAT. OFF.

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THE MATERIAL OF A THOUSAND USES

Index of Raw Materials, Parts, Electrical Equipment

For all electrical products including electrically operated machines and appliances

Trade Names—Manufacturers' Names—Local Addresses

The names of all manufacturers are grouped alphabetically under the heading for the product they manufacture. Trade names also appear in alphabetical position under the subject identifying the product. Thus "Linolac" insulating varnish will be found in alphabetical position under the heading "Paint, Varnish, Lacquer."

Note: The Classified Index of ELECTRICAL MANUFACTURING is limited to those subjects of interest to the specific field which it covers, for obvious reasons. A complete Classified Index of all electrical commodities bought, sold, or used by Electrical Supply Jobbers, Contractors, Dealers, Central Stations and other electrical industry outlets appears regularly in each issue of ELECTRICAL RECORD as heretofore.

ALLOYS, LIGHT METAL
Bohn Aluminum & Brass Corp., 2512 E. Grand Blvd., Detroit, Mich.
Bohnalite. See Bohn Aluminum & Brass Corp.

ALUMINUM
(Also Aluminum Bronze Powder.)
Albron, Alcoa, Alumac. See Aluminum Co. of America.
Aluminum Co of America. 2444 Oliver Bldg., Pittsburgh.
Fairmont Aluminum Co., Fairmont, W. Va.

AMMETERS. See Instruments.

ARMATURE
Balancers. See Balancers, Armature.
Banding Machines. See Banding Machines, Armature
Bearings. See Bearings.
Buggies. See Lifts, Armature.
Coil Presses. See Presses, Armature Coil.
Coils. See Coils, Finished.
Core Punchings. See Discs, Armature.
Cranes. See Lifts, Armature.
Discs. See Discs, Armature.
Driers. See Ovens.
Growlers. See Testers, Coil.
Hoists. See Lifts, Armature.
Impregnators, Vacuum. See Ovens, Industrial.
Jacks. See Lifts, Armature.
Laminations. See Discs, Armature.
Lathes. See Lathes.
Lifts. See Lifts, Armature.
New. See Coils, Finished.
Notching Machines. See Notching Machines, Armature.
Pegs. See Pegs, Armature.
Pinion Pullers. See Pullers, Armature Shaft.
Repaired. See Repairing and Second-Hand.
Shaft Pullers. See Pullers, Armature Shaft.
Shaft Straighteners. See Straighteners, Armature Shaft.
Stands. See Stands, Armature.
Test Benches. See Test Benches, Armature.
Testers. See Testers, Coil; also Test Benches, Armature.
Torpedo Cord. See Twine, Armature Winding.
Trouble Shooters. See Testers, Coil; also Test Benches, Armature.
Trucks. See Lifts, Armature.
Wedges. See Pegs, Armature.
Winding Machines. See Winding Machines, Armature & Field Coil.
Winding Twine. See Twine, Armature.

ARMATURE & COIL SPRAY GUNS. See Spraying Outfits.

ARMORING MACHINES. See Wire Manufacturing Machines.

ARMS, FLEXIBLE. See Tubing Flexible Metallic.

ASBESTOS Shades. See Shades, Fabric.
Paper & Sheet. See Asbestos.
Slabs. See Asbestos Slabs.
Tape. See Tape, Asbestos.
Wire. See Wire, Insulated.
Yarn and Thread. See Yarn and Thread.

ASBESTOS
Sheet, Paper, Mill Board, Lumber.
Ambler Asbestos Shingle & Sheathing Co., Ambler, Pa.
Easco. See Eastern Asbestos Co.
Eastern Asbestos Co., Providence, R. I.
Ferodo & Asbestos, Inc., New Brunswick, N. J.
Johns-Manville Corp., New York, N. Y.

ASBESTOS SLABS
Slabs & Barriers for Switchboard.
Asbestos-Ebonoy. See Johns-Manville, Inc.
Ambler Asbestos Shingle & Sheathing Co., Ambler, Pa.
Deceleco, Inc., Wayne, Mich.
Electrobestos. See Johns-Manville Corp.
Ferodo & Asbestos, Inc., New Brunswick, N. J.
Johns-Manville Corp., New York, N. Y.
Transite. See Johns-Manville, Inc.
Zellite. See Deceleco, Inc.

BAGS, Vacuum Cleaner
Merrimack Mfg. Co., Boston, Mass.

BAKELITE MOULDS. See Dies, Die Makers.

BALANCERS, Armature
(Dynamic Balancing Machines—Balancing Ways).
Anderson Bros. Mfg. Co., Rockford, Ill. (Ways).
Armature Coil Equip. Co., 1415 Forestdale Ave., Cleveland, O. (Machine).
Bowsher Co., N. P., South Bend, Ind.
Olsen Testing Machine Co., Tinius, 500 N. 12th St., Philadelphia, Pa. (Machines)
Sundstrand Machine Tool Co., Rockford, Ill.
Twentieth Century. See Sundstrand Machine Tool Co.
Vibration Specialty Co., 1534 Winter, Philadelphia, Pa. (Machines).

BALL BEARINGS. See Bearings, Ball and Roller.

BANDING MACHINES, Armature
Columbia Machine Wks. & Malleable Iron Co., Atlantic Ave. & Chestnut St., Brooklyn, N. Y.
Electric Service Supplies Co., 17th & Cambria Sts., Philadelphia, Pa.
Peerless. See Electric Service Supplies Co.
Richon Company, Frank, Boston, Mass.

BARRIERS, Switchboard. See Slate; also Soapstone; also Asbestos.

BARS, BUS. See Brass, Bronze & Copper; also Aluminum.

BARS, Commutator
Anaconda. See American Brass Co.
American Brass Co., Waterbury, Conn.
Buckeye Tempered Copper & Brass Co., Mansfield, O.
Cameron Electric Mfg. Co., Ansonia, Conn.
Commutator Co., 121 N. Front, Minneapolis, Minn.
Electric Materials Co., North East, Pa.
Eureka Metal Products Corp., 91 Clay, North East, Pa.
Homer Commutator Co., 4748 Hough Ave., Cleveland.
Rome Brass & Copper Co., Div. of Revere Copper & Brass, Inc., Rome, N. Y.

BASES, Radio Tube. See Radio Molded Parts.

BASES, Reading Lamp
Metal, Pottery, Wood & Glass.

American Ring Co., Waterbury, Conn.
Aladdin Mfg. Co., Muncie, Ind.
Armor Bronze Co., Garwood, N. J.
Camden Art Tile & Pottery Co., Camden, Ark.
Estes & Sons, E. B., 5344 Grand Central Terminal, New
Fulper Pottery Co., Flemington, N. J.
Globe Metal Spinning Co., 178 Centre, New York, N. Y.
Heimill Products, Inc., 103 Mott, New York, N. Y.
Insulation Mfg. Co., New York Ave. and Herkimer St., Brooklyn, N. Y.
Marbleart. See Insulation Mfg. Co.
Natural. See Insulation Mfg. Co.
Rodale Mfg. Co., 200 Hudson, New York, N. Y.
Sneath Glass Co., Hartford City, Ind.
Van Briggle Tile & Pottery Co., Colorado Springs, Colo.
Weller, S. A., Zanesville, O. (Pottery.)
Yokel Corp., 219 Homestead Ave., Hartford, Conn.
Zane Pottery Co., South Zanesville, O.

BATTERY CHEMICALS. See Chemicals, Battery.
BATTERY CUT OUTS. See Switches, Battery.
BATTERY GAGES. See Instruments, Pocket.
BATTERY JARS. See Jars, Battery, Glass; also Rubber; also Molded Insulation.
BATTERY OXIDES. See Chemicals, Battery.
BATTERY SALTS. See Chemicals, Battery.
BEAD CHAIN. See Chain, Socket.
BEADS, Chandelier. See Crystals, Chandelier.

BEADS, Insulating
American Lava Corp., 1425 William, Chattanooga, Tenn.
Durco. See Struthers Dunn, Inc.
Martindale Elec. Co., 1362 W. Fourth, Cleveland, O.
Struthers Dunn, Inc., 138 N. Juniper, Philadelphia, Pa.
Stupakoff Laboratories, 6627 Hamilton Ave., Pittsburgh, Pa.

BEARINGS
Ball & Roller. See Bearings, Ball & Roller.
Graphite. See Bearings, Oil-less.
Oil-less. See Bearings, Oil-less.
Sleeve. See Bearings & Bushings.

BEARINGS, Ball and Roller
Aetna Ball Bearing Mfg. Co., Chicago, Ill.
Ahlberg Bearing Co., 312 E. 29th, Chicago, Ill.
Auburn Ball Bearings Co., 73 Clarissa, Rochester, N. Y.
Bantam Ball Bearing Co., South Bend, Ind.
Bearings Co. of America, Lancaster, Pa.
Commercial. See Schatz Mfg. Co.
C J B. See Ahlberg Bearing Co.
Fafnir Bearing Co., New Britain, Conn.
Federal Bearing Co., Poughkeepsie, N. Y.
Gurney. See Marlin-Rockwell Corp.
Gwilliam Co., 360 Furman, Brooklyn, N. Y.
Hyatt Roller Bearing Div. of General Motors Corp., Harrison, N. J.
Hoffman. See Norma-Hoffman Bearings Corp.
McGill Metal Co., Valparaiso, Ind.
Marlin-Rockwell Corp., Gurney Ball Bearing Div., Jamestown, N. Y.
Matthews Mfg. Co., 104 Gold, Worcester, Mass.
New Departure Mfg. Co., Bristol, Conn.
Nice Ball Bearing Co. (Nicetown), Philadelphia, Pa.
Norma-Hoffman Bearings Corp., Stamford, Conn.
Roller Bearing Co. of America, Whitehead Rd., Trenton, Schatz Mfg. Co., Poughkeepsie, N. Y.
Schubert. See McGill Metal Co.
S R B. See Standard Steel & Bearings, Inc.
Standard Steel & Bearings, Inc., Plainville, Conn.
Strom Bearings Co., 4527 Palmer, Chicago, Ill.
S. K. F. Industries, 40 E. 34th, New York, N. Y.
Timken Roller Bearing Co., Canton, O.
Torrington Co., Torrington, Conn.
Zubler Bearings Co., 1321 W. Tioga, Philadelphia, Pa.

BEARINGS, Oil-Less
Argute Oilless Bearings Co., 149 Berkeley, Philadelphia, Pa.
B. M. C. See Burlington Metal Corp.
Bogert & Hopper, Inc., 225 Varick, New York, N. Y.
Bound Brook Oil-less Bearing Co., Bound Brook, N. J.
Burlington Metal Corp., Burlington, Wis.
Cleveland Graphite Bronze Co., 880 E. 72nd, Cleveland, O
Electric Railway Equipment Co., 30 Church, New York, N. Y.
Kirsen. See Electric Railway Equipment Co.
Graphalloy. See Graphite Metallizing Co.
Graphite Metallizing Co., Yonkers, N. Y.
Lubrite. See Merriam Bros., Yonkers, N. Y.
Merriam Bros., 185 Amory, Boston, Mass.
Metal Saw & Machine Co., Springfield, Mass.
Moraine Products Co., First & Foundry Sts., Dayton, O.
Neveroil Bearing Co., Wakefield, Mass.
Nolu Oilless Bearing Co., 6 E. Johnson, Philadelphia, Pa.
O. & S. Bearing Co., 215 S. Artillery, Detroit, Mich.
Reliance. See Metal Saw & Machine Co.
Seib Lignum-Vitae Woodturning Co., 98 Boyd Ave., Jersey City, N. J.
United States Graphite Bearing Co., Saginaw, Mich.

BEARINGS AND BUSHINGS
(For Armature Shafts.)
Adjustable Bearing Co., 101 Transportation Bldg., Indianapolis, Ind.
Ajax Metal Co., Philadelphia, Pa.
American Bronze Corp., Berwyn, Pa.
Bohn Aluminum & Brass Corp., 2512 E. Grand Blvd., Detroit, Mich.
Bunting Brass & Bronze Co., Toledo, Ohio.
Damascus Bronze Co., Pittsburgh, Pa.
Durex. See Moraine Products Co.
Federal-Mogul Corp., Shoemaker & Lillibridge Sts., Detroit,

Ball and Socket Joint

INSULATORS
ask for samples
STRUTHERS DUNN, INC.
134 North Juniper Street, Philadelphia, Pa.

Flood City Mfg. Co., Johnstown, Pa.
Johnson Bronze Co., New Castle, Pa.
Lumen Bearing Co., Buffalo, N. Y.
Moraine Products Co., First & Foundry Sts., Dayton, O.
National Bearing Metal Corp. (More-Jones Brass & Metal Div.), 4930 Manchester Ave., St. Louis, Mo.
United States Graphite Co., Saginaw, Mich.

BELTING, Chain Transmission. See Chain, Power Transmission.

BELTS, Rubber
Molded Cord Rubber Belts for Electrical Appliances.
Dayton Rubber Mfg. Co., Dayton, O.
Fay Rubber Products Co., Elyria, O.
Gilmer Co., L. H., Cottman & Keystone Sts. (Tacony), Philadelphia, Pa.
Todd Drain-A-Tub Co., 1108 Walnut, Kansas City, Mo.

BENDERS, Coil Loop
Armature Coil Equipment Co., 2415 Forestdale Ave., Cleveland, Ohio.
Electric Service Supplies Co., 17th & Cambria Sts., Philadelphia, Pa.
Segur. See Electric Service Supplies Co.

BENDING. See Punching & Bending.
BINDING POSTS. See Posts, Binding.

BLADES, Fan
Estes & Sons, E. B., 5344 Grand Central Terminal Bldg., New York, N. Y.
Reading Elec. Co., Inc., 24 Frankfort, New York, N. Y.
Torrington Mfg. Co., Torrington, Conn.

BLOCKS, Terminal. See Terminal Blocks.

BLUESTONE. See Chemicals, Battery.
BOARD, Fuller. See Cloth and Paper.
BOARD, Press. See Cloth and Paper.
BOMBARDING MACHINES. See Machines, Lamp Making.
BOWL HOLDERS. See Fixture Fittings.
BOX & CABINET BUSHINGS. See Bushings, Box & Cabinet.

BOX BOARD
Container Corp. of America, 111 W. Washington, Chicago.
Mid-West Box Co., 111 W. Washington, Chicago.

BOXES, Fibre
Container Corp. of America, 111 W. Washington, Chicago.
Mid-West Box Co., 111 W. Washington, Chicago.
BOXES, Sheet Steel. See Cabinets, Sheet Steel.
BOXES, Wood. See Cabinets & Boxes, Wood.

BOXES AND WRAPPERS
Brown & Bailey Co., 417 N. Eighth, Philadelphia, Pa.
Bulldog. See Pittsburgh Corrugated Paper Box Co.
Campbell Paper Box Co., South Bend, Ind.
Consolidated Paper Co., Monroe, Mich.
Container Corp. of America, 111 W. Washington, Chicago.
Gair Co., Robert, 420 Lexington Ave., New York. (Boxes.)
Gator-Hide Kraft. See International Paper Co.
Hinde & Dauch Paper Co., 325 Decatur, Sandusky, Ohio.
Huntington Paper Box Co., Huntington, Ind.
International Paper Co., 100 E. 42nd, New York, N. Y.
Lake Lithographing Co., 2570 Superior Ave., Cleveland, O. (Display Cartons.)
Mid-West Box Co., 111 W. Washington, Dept. 36, Chicago.
National Folding Box Co., New Haven, Conn. (Cartons.)
Pequot Mfg. Corp., Glendale (L. I.), New York.
Pittsburgh Corrugated Paper Box Co. Pittsburgh, Pa.
River Raisin Paper Co., Monroe, Mich.
Rockford Fibre Container Co., Rockford, Ill.
Shuttleworth Carton Co., 474 W. Broadway, New York.

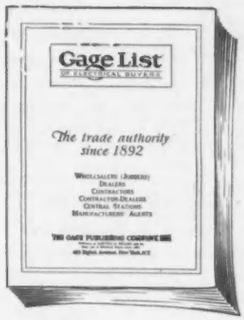
BRACKETS, Instrument
For Suspending Meters to Station Switchboard.
General Electric Co., Schenectady, N. Y.
Roller-Smith Co., 220 Broadway, New York, N. Y.
Trumbull Elec. Mfg. Co., Plainville, Conn.
Westinghouse Elec. & Mfg. Co., E. Pittsburgh, Pa.

BRAIDING MACHINES. See Wire Manufacturing Machines.

BRASS TUBING. See Tubing, Brass and Copper.

BRASS, BRONZE AND COPPER
Sheet, Rod, Bar.
Anaconda. See American Brass Co.
American Brass Co., Waterbury, Conn.
American Nickeloid Co., Peru, Ill.
Baltimore Brass Co., 1212 Wicomico, Baltimore, Md.
Baltimore Copper Mills, Div. of Revere Copper & Brass, Inc., Baltimore, Md.
Bohn Aluminum & Brass Corp., 2512 E. Grand Blvd., Detroit, Mich.
Bohnalite. See Bohn Aluminum & Brass Corp.
Bridgeport Brass Co., 774 E. Main, Bridgeport, Conn.
Buffalo Bronze Die Cast Corp., 100 Arthur, Buffalo, N. Y.
Dallas Brass & Copper Co., Div. of Revere Copper & Brass, Inc., 820 Orleans, Chicago, Ill.
Durbar. See Buffalo Bronze Die Cast Corp.
Electric Materials Co., North East, Pa.
Federal-Mogul Corp., Shoemaker & Lillibridge Sts., Detroit.
Higgins Brass & Mfg. Co., Div. of Revere Copper & Brass, Inc., 12435 Dequindre, Detroit, Mich.
Johnson Bronze Co., New Castle, Pa.
Michigan Copper & Brass Co., Div. of Revere Copper & Brass, Inc., 5851 W. Jefferson Ave., Detroit, Mich.
Nickeloid. See American Nickeloid Co.
Plume & Atwood Mfg. Co., 474 Bank, Waterbury, Conn.
Scovill Mfg. Co., Waterbury, Conn.
Seymour Mfg. Co., Seymour, Conn.
Taunton-New Bedford Copper Co., Div. of Revere Copper & Brass, Inc., Taunton, Mass.
Titan Metal Mfg. Co., Bellefonte, Pa. (Rods and Forgings.)
Western Cartridge Co., East Alton, Ill.

BREAKERS, Circuit. See Circuit Breakers.
BRIDGES, Wheatstone. See Instruments, Laboratory Standard.
BRONZE. See Brass, Bronze and Copper; also Castings.
BRONZE, Phosphor. See Phosphor Bronze.
BRONZE POWDER, Aluminum. See Aluminum.
BRUSH HOLDERS. See Brushes, Commutator.



Build your sales on *known* and *guaranteed* selling data

Note:

A feature of the Gage List is the **MONTHLY BULLETIN** of changes—keeping it always up-to-date

The Gage List of Electrical Buyers is as complete and accurate as daily checking and cross-checking can make it. This recognized buyer analysis lists every known electrical buyer in the country, including 11,920 Contractor-Dealers. These are classified by states and groups, and keyed for simple reference.

THE GAGE PUBLISHING COMPANY, INC.
461 Eighth Avenue New York, N. Y.

Gage List
OF ELECTRICAL BUYERS

The trade authority since 1892

BRUSHES, Carbon. See Brushes, Commutator.
Graphite. See Brushes, Commutator.
Metal Graphite. See Brushes, Commutator.

BRUSHES, COMMUTATOR

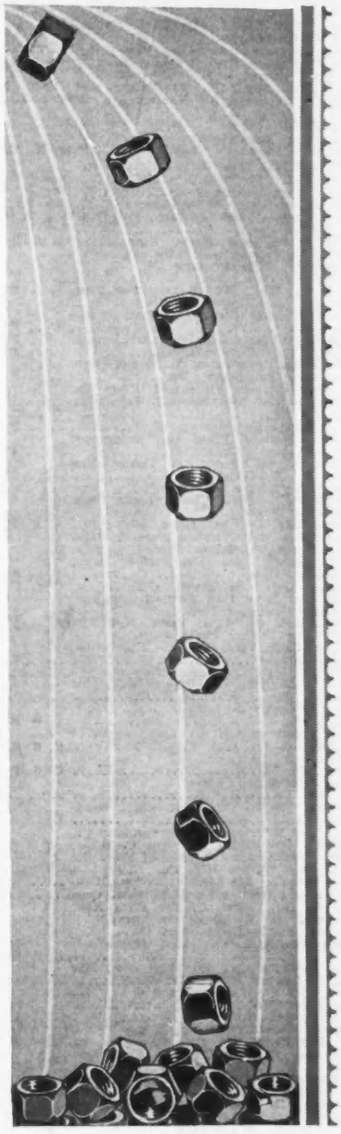
(Brushes, Brush Holders and Flexible Leads.)
Brush Holders ..... See B
Carbon, Graphite, Metal Graphite ..... See C
Flexible Leads and Pig Tails ..... See L
Sheet Metal ..... See B
Wire Gauze ..... See W

Automotive Mfg. Co., Kansas City, Mo. .. .. .

Speed up production . . cut costs . . increase profits

with

Anaconda Free-Turning Brass Rods

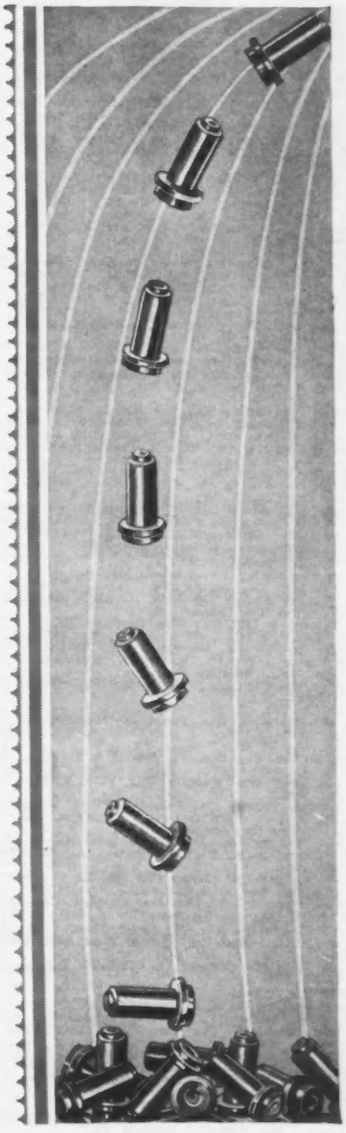


CONFIRMING the experience of others, a large manufacturer of screws, nuts and miscellaneous parts has found that the use of brass for screw machine products increases his rate of production to such an extent that it generally offsets the higher cost of the metal. This, coupled with the high value of brass scrap, combines in the majority of cases to bring the total cost of a finished piece in brass well below that in steel.

In the specific case of the manufacturer referred to, the substitution of Anaconda Free-Turning Brass Rods for steel permitted a much greater surface speed and tool feed, effecting an average production increase of 375% in four typical cases. At the same time, reduction in machine, tool and labor costs, plus the value of the scrap, reduced net costs per M pieces on an average of 13% in the same four cases.

Many manufacturers, producing a wide range of parts, are using brass for the foregoing and other reasons. The experience of these concerns is the basis for the information contained in our new booklet, "Anaconda Free-Turning Brass Rods".

THE AMERICAN BRASS COMPANY
General Offices: Waterbury, Conn.
Offices and Agencies in the Principal Cities



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Dick Bros., Inc., Reading, Pa.
Eureka Metal Products Corp., 91 Clay, North East, Pa.
Faries Mfg. Co. Decatur, Ill.
Federal-Mogul Corp., Shoemaker & Lillibridge Sts., Detroit,
Harsch, John, Bronze & Foundry Co., 11612 Madison Ave., Cleveland, O.
Johnson Bronze Co., New Castle, Pa.
McGill Metal Co., Valparaiso, Ind.
National Bronze & Aluminum Foundry Co., 88th & Lexy, Cleveland, O.
Ohio Pattern Wks. & Fdy. Co., 2730 Spring Grove Ave., Cincinnati, O.
Rabun Bronze Foundry, 617 West Belgrave, Huntington Park, Cal.
Sterling Art Metal Wks., 40 Purvis, Long Island City, N. Y.
Tenual. See National Bronze & Aluminum Foundry Co.
United Metal Mfg. Co., Inc., 25 Shipping, Norwich, Conn

CASTINGS, Die
Advance Tool & Die Casting Co., 1654 Holton, Milwaukee.
Alemite Die-Casting & Mfg. Co., Woodstock, Ill.
Allied Die-Casting Corp., Long Island City, N. Y.
Alumac. See Aluminum Co. of America.
Aluminum Co. of America, 2471 Oliver Bldg., Pittsburgh.
American Brass Co., Waterbury, Conn.
Anaconda. See American Brass Co.
American Die Casting Co., 2040 Dominick, Chicago, Ill.
Badger Die Casting Co., 155 Buffalo, Milwaukee, Wis.
Barnhardt Bros. & Spindler, Monroe & Throop St., Chicago.
Bohn Aluminum & Brass Corp., 2512 E. Grand Blvd., Detroit, Mich.
Bohnalite. See Bohn Aluminum & Brass Corp.
Do-Di. See Doehler Die Casting Co.
Doehler Die Casting Co., 386 Fourth Ave., New York, N. Y.
Franklin Die Casting Corp., 826 Gifford, Syracuse, N. Y.
Illinois Die Castings Co., 551 W. Congress, Chicago, Ill.
Krone-Seebek Die Casting & Mfg. Co., 2935 W. 47th, Chicago, Ill.
Milwaukee Die Casting Co., 299 Fourth, Milwaukee, Wis.
National Die Casting Co., 600 N. Albany Ave., Chicago.
Newton Die Casting Corp., 146 Munson, New Haven, Conn.
Paragon Die Casting Co., 2701 N. Crawford Ave., Chicago.
Permite. See Aluminum Industries, Inc.
Phoenix Die Castings Co., 21 Illinois, Buffalo, N. Y.
Pittsburgh Die Casting Co., 7506 Ardmore, Swissvale, Pa.
Precision Die Casting Corp., Syracuse, N. Y.
Stewart Die Casting Co., 4500 Fullerton Ave., Chicago, Ill.
Superior Die Casting Co., 873 E. 70th, Cleveland, Ohio.
Twin City Die Castings Co., Talmadge and 33rd Aves., S. E., Minneapolis, Minn. (White Metal).

CASTINGS, Gray iron
American Engineering Co., Philadelphia, Pa.
Athens Foundry Co., Athens, Pa.
Barlow Foundry Co., 551 N. J. R. R. Ave., Newark, N. J.
Barnett Foundry Co., Newark, N. J.
Berks Foundry & Mfg. Co. West Hamberg, Pa.
Bonnell Elec. Mfg. Co., 192 Chambers, New York, N. Y.
Bridgeport Castings Co., 250 North Ave., Bridgeport, Conn.
Chicago Hardware Foundry Co., 209 W. Randolph, Chicago.
Dick Bros., Inc., Reading, Pa.
Fairmount Foundry, Inc., Third & Westmoreland Sts., Philadelphia, Pa.
Farquhar Co., Ltd., A. B., York, Pa.
Forest City-Walworth Run Fuondries Co., 2500 W. 27th, Cleveland, O.
Gray Iron Foundry Co. Reading, Pa.
Laytham & Son, Co., Wm. P., Market & E. 34th, Paterson, N. J.
Milwaukee Grey Iron Foundry Co., 3910 Mitchell, Milwaukee, Wis.
North Lebanon Foundry Co., Second & Canal, Lebanon, Pa.
North Wales Mach. Foundry Co., North Wales, Pa.
Products Machine Co., Bridgeport, Conn.
Sacks Iron Foundry, L., 357 Wilson Ave., Newark, N. J.
Sharples Separator Co., Biddle & Patten Ave., Westchester, Pa.
Snead & Co., Pine St., Jersey City, N. J.
Union Mfg. Co., New Britain, Conn.
Western Foundry Co., Kedzie Ave. at 36th, Chicago, Ill.

CASTINGS, Malleable Iron
Eastern Malleable Iron Co., Naugatuck, Conn.
Southern Malleable Iron Co., 21st & Bond Ave., East St. Louis, Ill.
St. Louis Malleable Castings Co., 7701 N. Conduit Ave., St. Louis, Mo.

CASTINGS, Steel
Bonney-Floyd Co., Columbus, Ohio.
Eastern Steel Casting Co., Ave. L & Edward St., Newark
Northwestern Steel & Iron Corp., 2907 Fourth, S. E., Minneapolis, Minn.
Pittsburgh Malleable Iron Co., Pittsburgh, Pa.
Precisn. See Northwestern Steel & Iron Corp.
Riverside Steel Casting Co., Jacobus Ave., Kearney, N. J

CEMENT, Commutator
Anchorlute. See Technical Products Co.
Commutator Companion. See Withington Div. of Marnot Co.
Conductalute. See Technical Products Co.
Early, Edward E., 1129 W. Fifth, N. W., Canton, O.
Fixkwick. See Technical Products Co.
Ideal Commutator Dresser Co., 1039 Park Ave., Sycamore, Ill.
Imperial. See Martindale Electric Co.
Martindale Elec. Co., 1262 W. Fourth, Cleveland, O.
Mitchell Rand Mfg. Co., 19 Vesey, New York, N. Y.
Perco-Lute. See Perfection Supply Co.
Perfection Supply Co., 98 Park Pl., New York, N. Y.
Pias Mica Co., 26 St. Andrews Place, Yonkers, N. Y.
Technical Products Co., Pittsburgh, Pa.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa
Withington Div. of Marnot Co., 50 Thayer, Boston, Mass.

CEMENT, Liquid Porcelain
Anchorlute. See Technical Products Co.
Fire Lute. See Technical Products Co.
Insa-Lute. See Technical Products Co.
Okonite Co., Passaic, N. J.

Patch-O-Namel. See Technical Products Co.
Repairet Mfg. Co., Milwaukee, Wis.
Stupakoff Laboratories, 6627 Hamilton Ave., Pittsburgh, Pa.
Technical Products Co., Pittsburgh, Pa.
Thermold. See Technical Products Co.

CHAIN, Chandelier (Fancy). See Crystals, Chandelier.

CHAIN DRIVES. See Chain, Power Transmission.

CHAIN, Fixture
Acco. See American Chain Co.
American Chain Co., Bridgeport, Conn.
Chase Brass & Copper Co.
Eastern Chain Works, 309 E. 22nd St., New York, N. Y.
Faries Mfg. Co., Decatur, Ill.
Globe Metal Mfg. Co., 2122 E. Hazard, Philadelphia, Pa.
H. & O. Chain Co., So. Norwalk, Conn.
Newark Metal Mfg. Co., 22 S. 6th, Newark, N. J.
Plume & Atwood Mfg. Co., Waterbury, Conn.
Rodale Mfg. Co., 200 Hudson, New York, N. Y.
Steele & Johnson Mfg. Co., Waterbury, Conn.
Universal Metal Chain Co., 75 Clymer, Brooklyn, N. Y.

CHAIN, Power Transmission
Baldwin Chain & Mfg. Co., Worcester, Mass.
Boston Gear Wks. Sales Co., Norfolk Downs, Mass.
Diamond Chain & Mfg. Co., Indianapolis, Ind.
Link-Belt Company, 910 S. Michigan Ave., Chicago, Ill.
Morse Chain Co., Ithaca, N. Y.
Ramsey Chain Co., Inc., Albany, N. Y.
Reeves Pulley Co., Columbus, Ind.
Renold Boston. See Boston Gear Wks
Union Chain & Mfg. Co., Sandusky, O.
Whitney Mfg. Co., Hartford, Conn.

CHAIN, Socket
American Ball Chain Works, 12 Wooster St., New York.
Read Chain Mfg. Co., Bridgeport, Conn.
R. & O. Chain Co., South Norwalk, Conn.

CHANDELIER BEADS. See Crystals, Chandelier.

CHANDELIER CRYSTALS. See Crystals, Chandelier.

CHANDELIER FRINGE. See Crystals, Chandelier.

CHARGERS, Magnet
Charging, Remagnetizing.
Colpin Corp., 6110 S. Main, Los Angeles, Cal.
Cowie Elec. Co., E. S., 1823 Wyandotte, Kansas City, Mo.
Fure Elec. Mfg. Co., 5255 Wabada Ave., St. Louis, Mo.
Scintilla Magneto Co., Inc., Sidney, N. Y.
Valley Electric Co., 4231 Forest Park Blvd., St. Louis, Mo.

CHEMICALS, Battery
Electrolyte, Battery Salts, Battery Oxides, Sal Ammoniac, Bituminous, Manganese.
Cooper & Co., Charles, 194 Worth, New York, N. Y.
Eagle-Picher Lead Co., 134 N. LaSalle, Chicago. (Oxide.)
Eimer & Amend, 205 3rd Ave., New York, N. Y.
Electrex. See Goodyear Chemical Co., Inc.
Electro Chemical Co., 113 W. Court St., Dayton, O.
General Metallic Oxides Co., Jersey City, N. J.
Globe Chemical Co., Murray Rd. and Big Four R. R., Cincinnati, O.
Goodrear Chemical Co., Inc., 20 W. 22nd, New York, N. Y.
Grasselli Chemical Co., Guardian Bldg., Cleveland, O.
Kalbfleisch Corp., 200 5th Ave., New York, N. Y.
Klinstein Co., 644 Greenwich, New York, N. Y.
Lightning Co., St. Paul, Minn.
Merrimac Chemical Co., 148 State, Boston, Mass.
Powers-Weightman-Rosengarten Co., Philadelphia, Pa.
Voltah. See Powers-Weightman-Rosengarten Co.
Wah Chang Trading Corp., 233 Broadway, New York, N. Y.

CHEMICALS, Refrigeration
Ansul Chemical Co., Marinette, Wis.
Arctic. See Roessler & Hasslacher Chemical Co.
Carbide & Carbon Chemicals Corp., 30 E. 42nd, New York, N. Y. (Butane & Isobutane.)
Dry Ice Corp. of America, 50 E. 42nd, New York, N. Y.
Roessler & Hasslacher Chemical Co., 709 Sixth Ave., New York, N. Y. (Methyl Chloride, Ethyl Chloride.)
Virginia Smelting Co., West Norfolk, Va. (Sulphur Dioxide.)
Chromium Plating. See Plating & Finishing.

CHUCKS, Magnetic
J & H Elec. Co., 200 Richmond, Providence, R. I.
Simmons. See Taft-Pierce Mfg. Co.
Taft-Peirce Mfg. Co., Woonsocket, R. I.
Walker Co., O. S. (Rockdale), Worcester, Mass.

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Air and Oil Circuit Breakers and Oil Break Switches.
Allen-Bradley Co., 494 Reed, Milwaukee, Wis.
Anderson Mfg Co., Albert & J. M., 289 A, Boston, Mass
Anderson & Co., C. J., 212 W. Austin Blvd., Chicago, Ill.
Automatic Reclosing Circuit Breaker Co., Columbus, O.
Automatic Switch Co., 517 E. Larned, Detroit, Mich.
Burke Controller Co., 369 Lexington Ave., New York, N. Y.
Condit Elec'l Mfg. Corp., 838 Summer St. (South Boston), Boston, Mass.
Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee. (Mercury Type).
Domestic Elec. Co., Kent, O.
General Electric Co., Section W-234, Bridgeport, Conn.
Hart & Hegeman Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn.
Hartman Electrical Mfg. Co., 31 E. Fifth, Mansfield, Ohio.
High Tension Elecl. Specialty Co., 500 Washington, Abington, Mass.
Hitesco. See High Tension Elecl. Specialty Co.
H. & H. See Hart & Hegeman Div.
Inducto-therm. See Allen-Bradley Co
I. T. E. Circuit Breaker Co., 19th and Hamilton Sts., Philadelphia, Pa.
Line Material Co., South Milwaukee, Wis. (Oil Switches.)
Maple Co., R. H., Indianapolis, Ind.
Martindale Elec. Co., 1262 W. Fourth, Cleveland, O.
Minibraker. See Burke Controller Co.
Roller-Smith Co., 239 Broadway, New York, N. Y.
Sentinel. See Westinghouse Elec. & Mfg. Co.
Takamine Corp., 208 Rawson, Long Island City, N. Y
Time-O-Stat Controls Co., Cramblett Engineering Div. 236, Milwaukee Ave., Milwaukee, Wis.
U-Re-Lite. See I. T. E. Circuit Breaker Co
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa

CIRCUIT TESTERS. See Testers, Fuse and Circuit

CLEANER BAGS, Vacuum. See Bags, Vacuum Cleaner

CLEANER BRUSHES, Vacuum. See Brushes for Vacuum Cleaners.

CLEANERS, Metal
Oakite Products, Inc., 26 Thames, New York, N. Y.

CLIPS, Fuse. See Fuse Clips.

CLIPS, Heater Plug
Gray Bros. Co., Piano, Ill.

CLOCK SWITCHES. See Switches, Time.

CLOTH GEARS. See Gears and Pinions, Composition.

CLOTH LOUD SPEAKER DIAPHRAGM. See Cloth, Untreated.

CLOTH RADIO GRILL. See Cloth, Untreated.

CLOTH, Untreated
Soyle & Co., John, 112 Duane, New York, N. Y.
Canvas, "Aeroplane Cloth," Cotton Duck, Drill, Diaphragm Cloth, Grill Fabrics, etc
Mitchell-Rand Mfg. Co., 19 Vesey, New York, N. Y.
Tindall Fabrics Corp., 200 Madison Ave., New York, N. Y. (Grill Cloth).

CLOTH, WIRE
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CLOTH AND PAPER, Insulating

Cloth, Insulated	See C
Paper, Insulated	See P
Fibre Paper (Fish Paper)	See F
Press Board (Fuller Board)	See B
Silk	See S

Acme Wire Co., New Haven, Conn. C S P . . .
Armco. See Rogers Paper Mfg. Co.
Armatite. See Mica Insulator Co.
Behr-Manning Corp., Troy, N. Y. . . . . P . . .
Brand & Co., Wm., 268 4th Ave., New York. . . . . P . . .
Campbellite. See National Vulcanized.
Carboloid Products Corp., 98 Front, Brooklyn, N. Y. . . . . C . . P . . .
Case Brothers, Inc., Highland, Park, Conn. . . . . P . . B
Case Mfg. Co., Unionville, Conn. . . . . P . . .
Case & Risley Press Paper Co., Oneco, Conn. . . . . .
Celoron Co., Bridgeport, Pa. . . . . P F B
C-F. See National Vulcanized Fibre Co.
Chicago Mica Co., 345 Campbell, Valparaiso, Ind. . . . . C . . . . .
Columbian Rope Co., Auburn, N. Y. . . . . P . . .
Continental-Diamond Fibre Co., Bridgeport, Pa. . . . . P . . .
De Jonge & Co., Louis, 69 Duane, New York, N. Y. (Condenser) . . . . . P . . .
Dexstar. See Dexter & Sons.
Dexter & Sons, C. H., Windsor Locks, Conn. (Condenser Tissue.)
Dielectric Mfg. Co., St. Louis, Mo. . . . . C S P . . B
Electrite. See West Virginia Pulp & Paper Co.
Fyberoid. See Wilmington Fibre Specialty Co.
General Electric Co., Merchandise Dept., Bridgeport, Conn. . . . . C . . P . . .
chandise Dept., Bridgeport, Conn. . . . . C . . P . . .
Hartford City Paper Co., Hartford City, Ind. (Glassine Condenser Tissue).
Hewitt & Bros., C. B., 16 Perry, New York C . . P . . .
Hi-Tex See Stevens Paper Mills.
Hollingsworth & Vose Co., 333 Washington, Boston, Mass. . . . . P . . .
Incella See Tarentum Paper Mills Co.
Insuline Corp. of America, 78 Cortlandt, New York, N. Y. . . . . F . .
Irvington Varnish & Insulator Co., Irvington, N. J. . . . . C S P . . .
Manning Paper Co., J. A., Troy, N. Y. . . . . B
Mica Insulator Co., 200 Varick, New York C S P . . B
Mitchell-Rand Mfg. Co., 19 Vesey, New York, N. Y. . . . . C S P F B
National Vulcanized Fibre Co., Wilmington, Del. . . . . F . .
New Jersey Wood Finishing Co., Woodbridge, N. J. . . . . C . . . . .
Ohmoid. See Wilmington Fibre Specialty Co.
Old Hick. See Hewitt & Bros., C. B.
Peerless. See National Vulcanized Fibre Co.
Riegels. See Warren Mfg. Co.
Rogers Fibre Co., 210 Lincoln, Boston, Mass. . . . . F . .
Rogers Paper Mfg. Co., So. Manchester, Conn. . . . . B
Schweitzer, Inc., Peter J., 200 Fifth Ave., New York, N. Y. (Condenser Tissue.)
Sico. See Standard Insulation Co.
Standard Insulation Co., East Rutherford, N. J. . . . . C S P . . .
Sterling Fireboard Co., 501 Fifth Ave., New York. (Varised Hard Fibreboard) . . . . . B
Sterlite. See Sterling Firebrand Co.
Stevens Paper Mills, Windsor, Conn. . . . . B
Tarentum Paper Mills Co., Tarentum, Pa. . . . . P . . .
Turbonite. See Brand & Co., Wm.
Union Mills Paper Mfg. Co., New Hope, Pa. . . . . P . . .
Warren Mfg. Co., 342 Madison Ave., New York, N. Y. . . . . P . . .
West Virginia Pulp & Paper Co., 230 Park Ave., New York. . . . . B
Wilmington Fibre Specialty Co., Wilmington, Del. . . . . P . . .

CLUTCHES, Magnetic
Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee, Wis

COIL (Coils).
Armature and Field. See Coils, Finished.
Choke (Radio). See Radio Circuit Components.
Driers & Impregnators. See Ovens.
Electromagnet. See Coils, Finished.
Flatteners. See Rolls, Coil Flattening.
High Frequency. See Electro-Therapeutic; also Radio Circuit Components; also Ignition Outfits.
Impregnators, Vacuum. See Ovens, Industrial.
Induction. See Coils, Finished; also Electro-Therapeutic
Loop Benders. See Benders, Coil Loop.
Medical. See Electro-Therapeutic.
Presses. See Presses, Armature Coil.
Radio. See Radio Circuit Components.
Removers. See Removers, Coil.
Resistance. See Units, Rods & Grids; also Radio Circuit Components.

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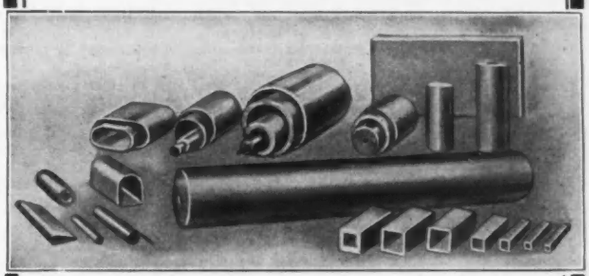

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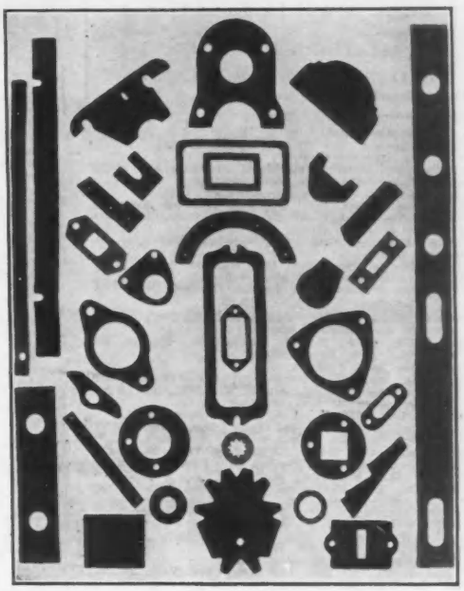

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Spark. See Ignition Outfits.
Spreaders. See Winding Machines, Armature and Field.
Tamping Tools. See Tools, Coil Tamping.
Taping Machines. See Taping Machines, Coil.
Testers. See Testers, Coil; also Test Benches, Armature.
Winders, Armature & Field Coil. See Winding Machines, Armature & Field Coil.
Winders, Induction Coil. See Winding Machines, Industrial Coil.
Winding Forms. See Forms, Coil Winding.
Windings (Magneto). See Coils, Finished.
Wire Tension Devices. See Tension Devices, Coil Wire

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Armature, Field, Electromagnet and Induction Coils.
Acme Products Co., Boston, Mass.
Anderson & Co., C. J., 212 W. Austin Ave., Chicago, Ill.
Acme Wire Co., New Haven, Conn.
Aero-Call. See Aero Products, Inc.
Aero Products, Inc., 4611 Ravenswood Ave., Chicago, Ill.
Auth Electrical Specialty Co., 422 E. 53rd St., New York.
A. & A. See Electrical Coil Winding Co
Belden Mfg. Co., 4633 W. Van Buren, Chicago, Ill.
Bunnell & Co., J. H., 32 Park Place, New York, N. Y
Burke Controller Co., 369 Lexington Ave., New York, N. Y
Concourse Electric Co., 224 E. 137th, New York, N. Y.
Coto Coil Div. of Universal Winding Co., Providence, R. I.
Ditmar Elec. Co., Brookline, Mass.
Dudlo Mfg. Co., Div. of General Cable Corp., Fort Wayne.
Easton Coil Co., Easton, Pa.
Electric Heat Control Co., 5902 Carnegie Ave., Cleveland, O
Electric Valve Mfg. Co., 64 Murray, New York, N. Y.
Electrical Coil Winding Co., 2735 Saunders, Camden
Fredericks Co., H. M., Lock Haven, Pa.
Globe Technolitan Corp., Reading, Mass.
Herald Electric Co., 22 East End Ave., New York, N. Y
Inca Mfg. Co., Fort Wayne, Ind.
Marion Elec. Mfg Co., Mt Cliff, Jersey City, N. J.
National Elec. Corp., 228 High, Newark, N. J.
Pifer Elec. Repair & Mfg. Co., 3610 Superior Ave., Cleveland, O.
Polymet Mfg. Co., 829 E. 134th St., New York, N. Y.
Power Transformer Co., 145 W. 22nd, New York, N. Y.
Reisner Mfg. Co., W. H., Hagerstown, Md.
Robertson-Davis Co., 361 W. Superior, Chicago, Ill.
Robertson, Lee F., Inc., 532 West 22nd St., New York.
Rome Wire Co. (Div. of General Cable Corp.), Rome, N. Y
States Co., 19 New Park Ave., Hartford, Conn.
Stone & Barron, 210 E. Pratt, Baltimore, Md.
Toledo Standard Commutator Co., 2343 Smead Ave., Toledo, O.
Varley Duplex Magnet Co., 15 Exchange Place, Jersey City, N. J. (Electromagnetic only).
Wells Mfg. Co., Fond du Lac, Wis.

COMMUTATOR

Bars. See Bars, Commutator.
Cement. See Cement, Commutator.
Dressers. See Stones, Commutator.
Lubricants. See Compounds, Commutator.
New. See Commutators.
Refilled. See Repairing and Second Hand.
Slitters. See Slotting Machines & Tools, Commutator
Slotting Files. See Files, Commutator Slotting.
Soldering Machines. See Soldering Machines, Commutator
Stones. See Stones, Commutator.
Tighteners. See Tighteners, Commutator.
Truing Devices. See Tools, Commutator Truing.

COMMUTATORS

Cameron Electric Mfg. Co., Ansonia, Conn.
Cleveland Commutator Co., 1882 E. 55th, Cleveland, O.
Derby Commutator Co., Derby, Conn.
Electric Materials Co., North East, Pa.
Eureka Metal Products Corp., 91 Clay, North East, Pa.
Homer Commutator Co., 4748 Hough Ave., Cleveland.
Toledo Standard Commutator Co., Toledo, O.

COMMUTATOR BRUSHES. See Brushes, Commutator.

COMPOSITION PULLEYS. See Pulleys, Composition.

COMPOUNDS, Commutator

Allen Co., Inc., L. B., 6751 Bryn Mawr Ave., Chicago, Ill.
Armstrong. See Elec. Power Maintenance.
Consistency. See Warren Lubricant Co.
Cramolin, Inc., 25 W. 43rd St., New York, N. Y.
Dixon Crucible Co., Jos., Jersey City, N. J.
Doe & Co., Walter S., Kent, Ohio.
Gales. See McLennan & Co.
Goldmark Co., James, 83 Warren, New York, N. Y.
Kester Solder Co., 4212 Wrightwood Ave., Chicago, Ill.
McLennan & Co., K., 1751 West 35th, Chicago.
Perfection. See Warren Lubricant Co.
Sanderson. See Warren Lubricant Co.
Spermo. See Warren Lubricant Co.
Trotters. See Goldmark Co., James.
Warren Lubricant Co., 22 Maurice, Buffalo, N. Y.

COMPOUNDS, Sealing. See Wax and Compounds.

CONDENSER UNITS, Refrigerator

Bush Mfg. Co., Hartford, Conn.
McCord Radiator & Mfg. Co., Riopelle & E. Grand Ave., Detroit, Mich.
Rome-Turner Radiator Co., Rome, N. Y.
Wolverine Tube Co., 1431 Central Ave., Detroit, Mich.

CONDENSER, Electric

Sevison Magneto Engineering Co., 397 Phillips, Toledo, O.

CONDENSERS, Radio. See Radio Circuit Components.

CONDENSER TUBING. See Tubing, Brass and Copper

CONNECTORS, Pin-Plug

Klieg Bros. Universal Electric Stage Ltg. Co., 321 W 50th, New York, N. Y.

CONNECTORS, Wire

Ideal Commutator Dresser Co., 1039 Park Ave., Sycamore, Ill. (Solderless-Tapeless).

CONTACT POINTS. See Points, Contact.

CONTAINERS, Shipping. See Fibre Board Products.

CONTROLLERS, Motor

Actinostor. See Sundh Elec. Co.
Allen-Bradley Co., 494 Reed, Milwaukee, Wis.
Anderson & Co., C. J., 212 W. Austin Ave., Chicago, Ill.
Automatic Switch Co., 154 Grand, New York, N. Y.
Botts, Inc., James H., 1393 Sedgwick Ave., New York, N. Y. (Traffic.)
Burke Controller Co., 369 Lexington Ave., New York, N. Y.
B-Q Oil Burner Co., Stockton, Cal.

Clark Controller Co., 1146 E. 152nd, Cleveland, O.
Condit Elec'l Mfg. Corp., 838 Summer St. (South Boston), Boston, Mass.
Cutler-Hammer Mfg. Co., 1258 St. Paul Ave., Milwaukee.
Diamond Elect. Mfg. Co., 1330 N. 16th, Los Angeles, Cal.
Dinkey. See Elec. Controller & Mfg. Co.
Dunco. See Struthers Dunn, Inc.
E. C. & M. Youngstown. See Electric Controller & Mfg. Co.
Electric Controller & Mfg. Co., 2700 E. 79th, Cleveland, O.
Electrite. See Sundh Elec. Co.
Hercules. See Union Elec. Mfg. Co.
General Electric Co., Schenectady, N. Y.
Horni Signal Mfg. Corp., 515 Greenwich, New York.
Industrial Controller Div of Square D Co., S. Pierce & Hanover, Milwaukee, Wis.
Maimin Speed Control Corp., 251 W. 19th, New York. (Sewing Machines.)
Monitor Controller Co., 51 Gay, Baltimore, Md.
National Electric Controller Co., 5315 Ravenswood Ave., Chicago, Ill.
Refrigerating Specialties Co., 728 S. Sacramento Blvd., Chicago, Ill.
Reisto. See Allen-Bradley Co.
Rowan Controller Co., 306 N. Holliday, Baltimore, Md
Square D Co., 6060 Rivard, Detroit, Mich.
Struthers Dunn, Inc., 138 N. Juniper, Philadelphia, Pa.
Sundh Elec. Co., 209 Parkhurst, Newark, N. J.
Switcholone. See Condit Elec. Mfg. Co.
Thermaload. See Monitor Controller Co.
Trumbull Electric Mfg. Co., Plainville, Conn.
Uemco. See Union Elec. Mfg. Co.
Unelco. See Union Elec. Mfg. Co.
Union Elec. Mfg. Co., 934 Juneau Ave., Milwaukee, Wis.
Ward Leonard Elec. Co., 31 South, Mount Vernon, N. Y.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
W. K. See Westinghouse Elec. & Mfg. Co.

COPPER. See Brass, Bronze and Copper; also Castings

COPPER TUBING. See Tubing, Brass and Copper

CORD TIPS. See Tips, Cord.

CORD, Tinsel. See Tinsel Cord & Thread.

CORDS, Extension

Stupakoff Laboratories, 6627 Hamilton Ave., Pittsburgh, Pa.

CORES, RESISTANCE COIL (Lava)

American Lava Corp., 1425 William, Chattanooga, Tenn.
Crescent. See M. Kirchberger & Co.
Ee-El-Co. See Southern Lava Co.
Kirchberger & Co., M., 1425 37th, Brooklyn, N. Y.
Lavite. See Steward Mfg. Co.
Lavarock. See M. Kirchberger & Co.
Southern Lava Co., Roesville, Ga.
Steward Mfg. Co., D. M., Chattanooga, Tenn.
Tennessee Burner Mfg. Co., Chattanooga, Tenn.
XL. See Tennessee Burner Mfg. Co.

CORES, RESISTANCE COIL (Refractory Porcelain)

American Lava Corp., 1425 William, Chattanooga, Tenn.
Colonial Insulator Co., Akron, O.
Crowley & Co., Henry L., 1 Central Ave., West Orange, N. J.
Electrical Refractories Co., East Palestine, O.
Elemite. See Louthan Mfg. Co.
Fireite. See Hartford Faience Co.
Hartford Faience Co., Hartford, Conn.
Louthan Mfg. Co., E. Liverpool, O.
Stupakoff Laboratories, 6627 Hamilton Ave., Pittsburgh, Pa.
Thermal Syndicate, 58 Schenectady Ave., Brooklyn, N. Y.
Vitreosil. See Thermal Syndicate.
Woolley, Inc., W. Douglas, East Liverpool, O.

COTTON DUCK. See Cloth, Untreated.

COTTON SLEEVING. See Tape, Cotton.

COUNTERS, Revolution. See Tachometers.

COUPLINGS, Shaft (Flexible-Insulated)

Ajax Flexible Coupling Co., Westfield, N. Y.
Bartlett Hayward Co., Baltimore, Md
Bond Co., Charles, 617 Arch, Philadelphia, Pa.
Brown Engineering Co., 123 N. Third, Reading, Pa.
Falk Corp., Milwaukee, Wis.
Delbee Rubber Co., Syracuse, N. Y.
Francke, See Smith & Serrell.
General Electric Co., Schenectady, N. Y.
Grundy. See Bond Co.
Kanti Lever. See Brown Engineering Co.
Krone-Seebek Die Casting & Mfg. Co., 2935 W. 47th, Chicago, Ill.
Line, W. C., Syracuse, N. Y.
Lovejoy Tool Wks., 325 W. Ohio, Chicago, Ill.
Mather. See Reed Co.
Nuttall Wks. of Westinghouse Elec. & Mfg. Co., McCandless Ave. & Harrison St., Pittsburgh, Pa.
Oneida. See Delbee Rubber Co.
Smith & Serrell, 5 Halsey, Newark, N. J.
Webster Mfg. Co., 1856 N. Kostner Ave., Chicago, Ill.
Woods Sons Co., T. B., Chambersburg, Pa.

COVERING MACHINES, WIRE. See Wire Manufacturing Machines

COVERS, Paper and Fabric

For Lamp Shades, Paper & Fabric, Fans, Radio & Appliances.
Adjusto. See Phoenix Import Co.
Arkel Safety Rag Co., 10 E. 40th St., New York, N. Y. (For Motors, Fans, Lamp Shades.)
Boyle Co., John, 121 Duane, New York, N. Y. (Fan.)
Droutman Mfg. Co., 36 W. 60th, New York, N. Y.
Empire Shield Co., 590 Broadway, New York, N. Y.
Kennedy Car Liner Co., Shelbyville, Ind.
La Rose Mfg. Co., 757 Sixth Ave., New York, N. Y. (Rubberized Fan.)
Phoenix Import Co., 45 E. 25th, New York, N. Y. (Shade.)
Superb. See Droutman Mfg. Co.
Superior. See Empire Shield Co.

CRUCIBLES, Porcelain. See Porcelain.

CUPS, Grease

Rowen Products Corp., Auburn, New York.
Gits Bros. Mfg. Co., 1940 S. Kilbourn Ave., Chicago, Ill.
Lunkenheimer Co., Cincinnati, Ohio.

CUPS, Oil

Gits Bros. Mfg. Co., 1940 S. Kilbourn Ave., Chicago, Ill.

CUT OUTS, Battery. See Switches, Battery.

CUTTING OUTFITS, Metal. See Welding and Cutting Outfits.

CRANES, Floor. See Lifts, Armature.

CRYSTALS, Chandelier

Crystals, Prisms, Beads, Chains, Fringes.
Crystal Venezia. See Harrison & Co., Arthur.
Foulite. See Harrison & Co., Arthur.
Friedlaender Co., 49 W. 23rd, New York, N. Y.
Harrison & Co., Arthur, 561 W. Washington Blvd., Chicago.
Hirschberg, Shuts & Co., 268 4th Ave., New York, N. Y. (Fringes.)
Nelson Bead Co., 15 W. 37th, New York, N. Y. (Importer.)
Rialto Import Co., 112 W. 4th, New York, N. Y.
Schwartz Lighting Fixture Wks., 1341 Noble, Philadelphia.
Wyle & Bros., J. J., 20 E. 27th, New York, N. Y.

CURRENT INDICATORS. See Instruments, Pocket.

DASHBOARD METERS. See Instruments, Portable and Switchboard.

DECALCOMANIA

Meyercord Co., Chicago, Ill.
Novar. See Palm Fechteler & Co.
Palm Fechteler & Co., 67 5th Ave., New York, N. Y.

DIALS

Radio (Metal). See Radio Mountings.
Radio (Molded). See Radio Molded Parts
Enameled. See Dials, Enameled.

DIALS, Enameled

Whittier Co., Horace B., Pequabuck, Conn.

DIAPHRAGM, Cloth. See Cloth, Untreated.

DIE CASTINGS. See Castings, Die.

DIE CASTING MACHINES

Allied Die Casting Corp., Long Island City, N. Y.
Madison-Kipp Corp., Madison, Wisc.

DIE MAKERS. See Dies, Die Makers.

DIE SETS

Baumbach Mfg. Co., 1810 Kilbourn Ave., Chicago, Ill.
Danly Machine Specialties, Inc., 2104 S. 52nd Ave., Chicago, Ill.

DIES, Pipe. See Stocks, Dies and Reamers.

DIES, DIE MAKERS

Beaver Mfg. Co., 625 N. Third, Newark, N. J.
Caldbeck Tool & Mfg. Co., 307 East Third, Des Moines, Iowa.
Chicago Molded Products Co., 2148 Walnut, Chicago, Ill.
Kuhn & Jacob Machine & Tool Co., 502 Prospect Ave., Trenton, N. J.
Madison-Kipp Corp., 211 Waubesa, Madison, Wis.
Marsch & Nobel, 255 Greenwich, New York, N. Y.
Plymouth Mfg. Co., 2148 Walnut, Chicago, Ill.
Stein & Co., Wm. P., 424 St. Paul, Rochester, N. Y.

DIMMER, Theatre

Ward Leonard Elec. Co., 31 South, Mount Vernon, N. Y.

DISCS, Armature

Steel Discs, Laminations, and Segments for Motors and Transformers.
American Stamping Co., 978 E. 64th, Cleveland, O.
Cleveland Armature Works, 4732 St. Clair Ave., Cleveland.
Hercules Elec. Steel Corp., 145 Lafayette, New York, N. Y
Johnson, H. D., 170 Mahncke Court, San Antonio, Texas.
Lamination Stamping Co., 764 Windsor, Hartford, Conn.
Niagara Machine & Tool Wks., 637 Northland, Buffalo
Valley Appliances, Inc., 634 Lexington Ave., Rochester, N. Y.
Willor Mfg. Corp., 117 Mercer, New York, N. Y.

DRAWING MACHINES, WIRE. See Wire Drawing Mach.

DRIVE SCREWS. See Screws, Drive

DRIVES, CHAIN. See Chain, Power Transmission

DYNAMOMETERS

Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
Clark Controller Co., 1146 E. 152nd, Cleveland, O
Diehl Mfg. Co., Elizabeth, N. J.
General Electric Co., Schenectady
EBONITE. See Rubber, Hard
ELECTROLYTE. See Chemicals, Battery
ELECTROMAGNETS. See Coils, Finished

ELECTRODES FOR GAS SIGNS

American Neon Sign Corp., 549 W. 132nd St., New York.
Eisler Electric Corp., 756 S. 13th, Newark, N. J.
Machlett & Son, 50 William, Long Island City, N. Y.
Manhattan Elect. Supply Co., 510 Sixth Ave., New York.
Ohio Neon Lamp Corp., Highland Ave., (Norwood) Cincinnati, O. (Housings)
Q R S. De Vry Corp., 333 N. Michigan Ave., Chicago.

ELECTRODYNAMOMETERS. See Instruments, Laboratory Standard

ELECTRO MAGNETS

Varley Duplex Magnet Co., 15 Exchange Pl., Jersey City, N. J.

ELEMENTS, Heating. See Units, Rods and Grids

ENAMELING MACHINES (For Magnet Wire)

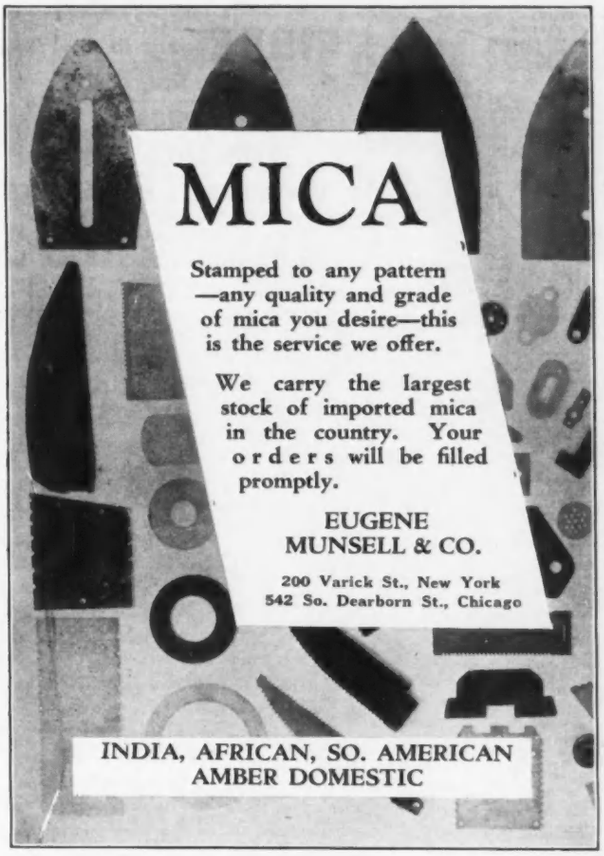
(See Also Wire Manufacturing Machines)
American Insulating Machinery Co., 519 Huntington Ave., Philadelphia, Pa.
Sleeper & Hartley, Inc., 335 Chandler, Worcester, Mass

ENGRAVING MACHINES

Portable Bench and Pedestal Outfits for Marking Metal.
Brewster Co., Wm., 30 Church, New York, N. Y.
Deckel. See Preis & Co., Inc., H. P.
Eisler Electric Corp., 756 S. 13th, Newark, N. J. (Tube Base Branders)
Engravograph Corp., 12 Vestry, New York, N. Y.
Etchograph. See Brewster Co., Wm.
Gilbert Supply Co., Independence, Iowa.
Gorton Machine Co., Geo., Racine, Wis.
Preis & Co., Inc., H. P., Newark, N. J.
Schmidt, Inc., Geo. T., 4100 Ravenswood Ave., Chicago, Ill.

ENGRAVING, Radio Panel

Engraving to Order.
Eastern Specialty Co., 3551 N. Fifth, Philadelphia, Pa.
Etch-O-Gravure. See Insuline Corp. of America.
General Fabricating Co., 165 Greenwich, New York, N. Y.
Globe Mfg. Co., 101 Spokane St., Seattle, Wash.
Insuline Corp. of America, 78 Cortlandt, New York, N. Y.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ENGRAVING. Radio Panel—Continued
Mechanical Engraving Co., 130 Orchard, Newark, N. J.
New England Products Co., 232 Greenwich, New York.
Preis & Co., Inc., H. F., 227 Fulton, New York, N. Y.
Schmidt, Inc., Geo. T., 4102 Ravenswood Ave., Chicago, Ill. (Tube Base Branders).
Schwenke Machine Engraving Co., 2086 Woodward Ave., Detroit, Mich.
Verichrome Laboratories, 4614 Spring Grove Ave., Cincinnati
Wright Radio Co., 114 Exchange, Rockland, Mass.

EYELETS
Monowatt Electric Corp., 24 W. 40th, New York, N. Y.
Platt Bros. & Co., Waterbury, Conn.
Waterbury Button & Moulding Co., 835 S. Main, Waterbury, Conn.

FABRIC, Radio Grill. See Cloth, Untreated.
FABRIC SHADES. See Shades, Fabric.
FAN BLADES. See Blades, Fan.

FEET, Felt
Brawley Felt Co., Inc., T. R., 279 20th, Brooklyn, N. Y.
Mattatuck Mfg. Co., Waterbury, Conn.

FELT
American Felt & Cutting Co., 609 W. Lake, Chicago, Ill.
American Felt Co., 315 Fourth Ave., New York, N. Y.
Booth Felt Co., 400 18th, Brooklyn, N. Y.
Brawley Felt Co., Inc., T. R., 279 20th, Brooklyn, N. Y.
Western Felt Wks., 4029 Ogden Ave., Chicago, Ill.

FERRULES
Aluminum Co. of America, 2444 Oliver Bldg., Pittsburgh.
Chase Brass & Copper Co., Waterbury, Conn.
Clark Metal Products, 490 Hancock Ave., Bridgeport, Conn.
Grammes & Sons, Inc., L. F., Allentown, Pa.
Massachusetts Machine Shop, Inc., Boston, Mass.
Patton-MacGuyer Co., Providence, R. I.
Platt Bros. & Co., Waterbury, Conn.
Riadon Mfg. Co., Naugatuck, Conn.
Scovill Mfg. Co., 99 Mill, Waterbury, Conn.
Waterbury Brass Goods Corp., Waterbury, Conn.
Waterbury Button & Moulding Co., Waterbury, Conn.

FIBRE BOARD PRODUCTS (Solid and Corrugated)
Container Corp. of America, 111 W. Washington, Dept. 36, Chicago, Ill.
Mid-West Box Co., 111 W. Washington, Chicago.

FIBER CANDLES. See Candles, Fixture.

FIBRE GEARS. See Gears and Pinions, Composition.
Paper. See Cloth and Paper.
Radio Panels. See Radio Molded Parts.
Shipping Containers. See Fibre Board Products.
Vulcanized. See Fibre, Vulcanized.

FIBRE, Phenol
Moisture Proof; Sheet, Rod, Tubes.
Aico. See American Insulator Corp.
Amerine. See American Insulator Corp.
Armite. See Spaulding Fibre Co.
Bakelite-Dilecto. See Continental Fibre Co.
Continental-Diamond Fibre Co., Bridgeport, Pa.
Electrical Insulation Corp., 308 W. Washington, Chicago, Ill.
Fibroe Insulation Co., 245 Lincoln Ave., Valparaiso, Ind.
Formica Insulation Co., 4626 Spring Grove Ave., Cincinnati, O.
Franklin Fibre Specialty Co., Wilmington, Del.
Laminated Phenol, Inc., 1228 S. Western Ave., Chicago, Ill.
Micarta. See Westinghouse Elec. & Mfg. Co.
National Vulcanized Fibre Co., Wilmington, Del.
Phenolite See National Vulcanized Fibre Co.
Spaulding Fibre Co., Tonawanda, N. Y.
Synthane Corp., Oaks, Pa.
Textolite. See Electrical Insulation Corp.
Vul-Cot. See National Vulcanized Fibre Co.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

FIBRE, Vulcanized
Sheet, Rod, Tube, Horn, Fibre, Bushings, Washers, Cleats, Screw Machine Products.
Brandywine Fibre Products Co., 1402 Walnut St., Wilmington, Del.
Conite. See Continental-Diamond Fibre Co.
Continental-Diamond Fibre Co., Bridgeport, Pa
Delaware Hard Fibre Co., Box 970M, Wilmington, Del.
Egyptian. See Delaware Hard Fibre Co.
Electrosote. See Pantasote Co.
Fibre Products Co., New Bedford, Mass.
Franklin Fibre Specialty Co., Wilmington, Del.
Fyberoid. See Wilmington Fibre Specialty Co.
Independent Laboratories, 50 E. 42nd, New York, N. Y
Insuline Corp. of America, 78 Cortlandt, New York, N. Y.
Iten Fibre Co., 5403 Bower Ave., Cleveland, O.
Leatheroid. See Rogers Fibre Co.
Lincoln Fibre & Specialty Co., Newport, Del.
National Vulcanized Fibre Co., Wilmington, Del.
Ohmold. See Wilmington Fibre Specialty Co.
Pantasote Co., Inc., 250 Park Ave., New York, N. Y.
Peerless. See National Vulcanized Fibre Co.
Rogers Fibre Co., 210 Lincoln, Boston, Mass.
Spaulding Fibre Co., Tonawanda, N. Y.
Standard Fibre Products Co., 36 Pleasant, Watertown, Mass.
Tweenten Fibre Co., 111 S. Jefferson, Chicago, Ill.
Vul-Cot. See National Vulcanized Fibre Co.
Vulcawood. See Continental-Diamond Fibre Co.
Wilmington Fibre Specialty Co., Wilmington, Del.

FIBRE WASHERS. See Fibre.
FIELD COILS. See Coils, Finished.

FILAMENTS, Incandescent Lamp
Cohn, Sigmund, 44 Gold, New York, N. Y.
Conneway Elec. Laboratories, 406 Jefferson St., Hoboken.
Filament Supply Co., 1317 Willow Ave., Hoboken, N. J.
Gilby Wire Co., Riverside Ave., Newark, N. J.
National-Harris Wire Co., 195 Verona Ave. Newark, N. J.
Nuetzl, Jul. N., 349 16th, Milwaukee, Wis.
Pierce Mfg. Co., 625 W. Jackson Blvd., Chicago, Ill.
Radio Products Corp., Stemeck Trust Bldg., Hoboken, N. J
Volkmer Radio Products Corp., 187 Sylvan Ave., Newark, N. J. (Lead-in-Welds.)

FILES, Commutator Slotting
Ideal Commutator Dresser Co., 1039 Park, Sycamore, Ill.
Martindale Electric Co., 1262 W. Fourth, Cleveland, O.

FISH PAPER. See Cloth and Paper.
FITTINGS, Fixture. See Fixture Fittings.
FIXTURE CANDLES. See Candles, Fixture.
FIXTURE CHAIN. See Chain, Fixture.
FIXTURE, Collars. See Fixture Fittings.

FIXTURE FITTINGS

	KEY
Bowl Holders	See B
Brass Fittings	See B
Canopies	See B
Collars	See B
Crow Feet	See I
Finials (Brass, Glass and Porcelain)	See B
Hangers	See H
Hickies, Brass	See B
Hickies, Iron	See I
Hooks, Brass	See B
Hooks, Iron	See I
Iron Fittings	See I
Loops, Brass	See B
Loops, Iron	See I
Rings	See B
Shade Holders	See S
Shells	See B
Spinnings	See B
Stampings	See B
Stems	See B
Straps	See H
Studs	See I

Acme Lighting Products, Inc., 2114 Woodland Ave., Cleveland, O. Straps ..... H
American Chain Co., Bridgeport, Conn. (Loops and Rings.) ..... B
American Ring Co., Waterbury, Conn. (Candle.) ..... S
Appleton Electric Co., 1703 Wellington Ave., Chicago, Ill. ..... B I
Arco. See American Ring Co.
Arrow Electric Division of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn ..... S
Artoloid. See Great Eastern Brass Wks., Inc.
Art Metal Co., 3721 Dayton, Cleveland, O. ..... H
Banlite. See East Side Metal Spinning Co.
Banner. See Plume & Atwood Mfg. Co.
Barton Brass Wks., 3627 Superior, Detroit ..... B
Belmet. See B. & L. Metal Stamping Co.
Bloch Bros., 68 Walker, New York ..... B
Brandt Mfg. Co., 3727 Gratiot Ave., Detroit. B
Braun, J. G., 609 S. Pauline, Chicago, Ill. (Pressed Ornaments.) ..... B I
Bryant Elec. Co., 1421 State, Bridgeport, Conn. ..... S
B. & L. Metal Stamping Co., 250 Moore, Brooklyn, N. Y. (Also Combination Wall Bracket Hanger.) ..... B I H
Cambridge Brass Co., Cambridge, Mass. ..... B
Chase Brass & Copper Co., Waterbury, Conn. B S
Chatham Metal Spinning & Stamping Corp., 128 Mott, New York, N. Y. ..... B I
Cleanezy. See Dunlap Co.
Colonial Stamping Co., Brill St. & Passaic Ave., Newark, N. J. ..... B S
Crescent Brass Mfg. Co., Reading, Pa. ..... B
Crouse-Hinds, Solvay Sta., Syracuse, N. Y. ..... S H
Diamond Needle & Mfg. Co., Torrington, Conn. (Hickies.) I
Dunlap Co., John, Carnegie, Pa. ..... S
East Side Metal Spinning Co., 451 Greenwich, New York, N. Y. ..... B
Eureka Tin Ware Mfg. Co., 135 W. 20th, New York, N. Y. ..... S
E-Z Up. See Plume & Atwood Mfg. Co.
Faries Mfg Co., Decatur, Ill. ..... B I S H
Fixturelite Mfg. Co., 468 W. Broadway, New York, N. Y. ..... B H
Flaherty Co., M. E., 28 S. Clinton, Chicago I
Fralick Co., S. R., 15 S. Clinton, Chicago I
Franklin Brass Foundry Co., Reading, Pa. ..... B
Friedley-Voehardt Co., Chicago ..... B
Grabler Mfg. Co., 6565 Broadway, S. E., Cleveland, O. I
Great Eastern Brass Wks., Inc., 182 Grand, New York, N. Y. (Spindles).
Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec Co., Hartford, Conn ..... S
Isco. See Fixturelite Mfg. Co.
Jiffy. See White Mfg. Co., J. H.
Kwikon. See Fralick Co., S. R.
Lakin. See Thomas & Betts Co.
Liberty Brass Turning Co., 88 Walker, New York, N. Y. I
Liberty Iron Pipe & Nipple Works, 62 Greene, New York, N. Y. ..... B I
Liberty Machine Co., Wauwatosa, Wis. ..... B I
L & K Mfg. Co., 440 Adelphi, Brooklyn, N. Y. ..... H
L. & W. Brass Wks., 361 W. Superior, Chicago. B
Madelite. See Belson Mfg. Co.
M. S. W. Mfg. Co., 1537 Niagara Ave., Buffalo, N. Y. I
Meta. Products Co., 210 Canal, New York ..... B
Metro Iron Ornament Co., 191 Christie, New York, N. Y. I
Metropolitan-Columbia Mfg. Co., 714 Metropolitan Ave., Brooklyn, N. Y. ..... B
Midwest Elec. Co., 1639 Walnut, Chicago, Ill. I
Mid-West Chandelier Co., 14th & Chestnut Sts., Kansas City, Mo. ..... B
Michell-Vance Co., 76 Washington, Brooklyn, N. Y. ..... S
Monarch. See Perfecilite Co.
Murlin Mfg. Co., Philadelphia, Pa. ..... B I
National Electric Products Corp., Pittsburgh, Pa. (Studs.) I
New Era Elec. Mfg. Co., 6725 Machinery Ave., N. E., Cleveland, O. ..... H
New Wrinkle. See Bryant Elec. Co.
New York Brass Turning Co., 568 Broadway, New York, N. Y. ..... B
Nobolt. See Fralick & Co., S. R.
N. W. Cleat Receptacle Bracket, 2437 N. 29th, Philadelphia, Pa. I
Onli. See Perfecilite Co.
Pass & Seymour, Solvay Sta., Syracuse, N. Y. B S
Perfecilite Co., 1457 E. 40th, Cleveland ..... S
Pittsburgh Valve & Fittings Co., Barberton, O. I
Plume & Atwood Mfg. Co., Waterbury, Conn. B S H
Plumwood. See Plume & Atwood Mfg. Co.
Plymouth. See Vester Sons, Alfred.
Products Machine Co., Bridgeport, Conn. ..... B
Reading Brass Co., 141 Schiller, Reading, Pa. B I
Ribaysen Mfg. Co., J., 952 W. Lake, Chicago, Ill. B
Rodale Mfg. Co., 200 Hudson, New York ..... B H
Sandow Tool Co., 1440 Bway, New York, N. Y. ..... S
Scovill Mfg. Co., Waterbury, Conn. B I
Simpalite. See Sprecher Mfg. Co., P. W.
Simplex. See Plume & Atwood Mfg. Co.
Springfast. See Plume & Atwood Mfg. Co.
Square-G. See Grabler Mfg. Co.
Standard Snap-Lite Corp., 504 Jackson Ave., Long Island City, N. Y. ..... S
Standard Metal Spinning Co., 128 Mott, New York, N. Y. ..... B
Star. See Perfecilite Co.
Star. See Steel City Elec. Co.
Steel City Elec. Co., Pittsburgh, Pa. I
Steele & Johnson Mfg. Co., Waterbury, Conn. B S

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Stembridge & Brandt, 29 S. Clinton, Chicago, Ill. (White Metal.) ..... B
Sterling Spinning & Stamping Wks., 476 Broome, New York, N. Y.
T. & B. See Thomas & Betts Co.
Thomas & Betts Co., 63 Vesey, New York I
Uno. See Bryant Elec. Co., also Crouse-Hinds, also General Elec. Co., also Hart & Hegeman Mfg. Co., also Pass & Seymour.
United. See L & K Mfg. Co.
United Metal Spinning Co., 440 Adelphi, Brooklyn, N. Y. ..... B
Vester, Sons, Alfred, 5 Mason, Providence, R. I. B
Victor. See Plume & Atwood Mfg. Co.
Virden, Div. of Gill-Virden Co., 6108 Longfellow Ave., Cleveland, O. ..... B
Walden Tool & Metal Mfg. Co., New Haven Conn. .....
Wameco. See Waterbury Metal Wares Co.
Waterbury Metal Wares Co., Waterbury, Conn. ..... S
Weber Brass Co., Whitney Power Block, Cleveland, O. ..... B
White Diamond. See White Mfg. Co., J. H.
White Mfg. Co., J. H., 79 Madison Ave., New York, N. Y. ..... B S
Wilhite Machine Wks., 1245 S. Hope, Los Angeles, Cal. ..... B

FLASHERS, Sign
Motor Flashers, Thermal Flashers, Flashing Sockets and Plugs.
Ajax. See Reynolds Spring Co.
A. & W. See General Outdoor Adv. Co.
Angelus. See Electric Sign Flasher Corp.
Betts, Inc., James H., 1393 Sedgwick Ave., New York. (Motor Flashers, Thermal Flashers, Flashing Sockets and Plugs.)
Betts & Betts Corp., 645 W. 43rd, New York, N. Y. (Motor Flashers.) (Thermal Flashers.) Flashing Plugs.)
California Sign Flasher Co., 280 Guttenberg, San Francisco
Commercial Elec. Co., 1203 E. Grant, Portland, Ore.
Consolidated Elec. Sign Corp., Opalume Div., 99 West Main, Battle Creek, Mich.
Cramblet Engineering Div. of Time-O-Stat Controls Co., 286 Milwaukee, Milwaukee, Wis.
Diamond. See General Appliance Corp.
Dominic. See Kala-Flasher Co.
Eagle Elec. Mfg. Co., 79 Hall, Brooklyn, N. Y.
Electric Signal Corp., 406 Fourth Ave., Seattle, Wash.
Electric Sign Flasher Corp., 1426 W. 9th, Los Angeles, Cal.
Figuregram. See Reynolds Electric Co.
Flash O-Lite. See Betts, Inc., James H.
Flip-Flop. See Betts, Inc., James H.
Gem Engineering Co., Hempstead, N. Y.
Gacor. See General Appliance Corp.
General Appliance Corp., 120 8th, San Francisco, Cal. (Flasher Button.)
General Controler Co., 200 E. First, Dayton, O.
Grazier Elec'l Products Co., Johnstown, Pa.
Harrington-Seaberg Corp., 1708 Third Ave., Moline, Ill.
Horni Signal Mfg. Co., 516 Greenwich, New York, N. Y.
Jimbetts. See Betts, Inc., James H.
Kala-Flasher Co., 344 N. Church, Kalamazoo, Mich.
Killark. See Betts & Betts Corp.
Kontroler. See Leland Electric Co.
Leland Electric Co., Dayton, O.
Mercury. See Betts, Inc., James H.
Phelps Elec. Co., 29 S. Clinton, Chicago, Ill. (Motorless)
Phoenix Products Co., Phoenix, N. Y.
Presto Products Co., 520 Broadway, New York, N. Y. (Sockets and Plugs.)
Reco. See Reynolds Elec. Co.
Reynolds Elec. Co., 2850 W. Congress, Chicago, Ill.
Reynolds Spring Co., Jackson, Mich.
Rodale Mfg. Co., 200 Hudson, New York, N. Y.
Ryan. See Phoenix Products Co.
Shadoodle. See Phelps Elec. Co.
Sokit. See Betts, Inc., James H.
Thermo-Wynk. See Betts & Betts Corp.
Vacu. See Betts & Betts Corp.
Veebar. See Betts, Inc., James H.
Way, Eugene W., Seattle, Wash.
Wood Electric Co., C. D., 565 Broadway, New York N. Y.
Woodwin. See Wood Elec. Co., C. D.
Wynk-A-Lyte. See Betts & Betts Corp.

FLASHLIGHT LENSES. See Lenses.
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FLEXIBLE LEADS. Commutator Brush. See Brushes, Commutator.

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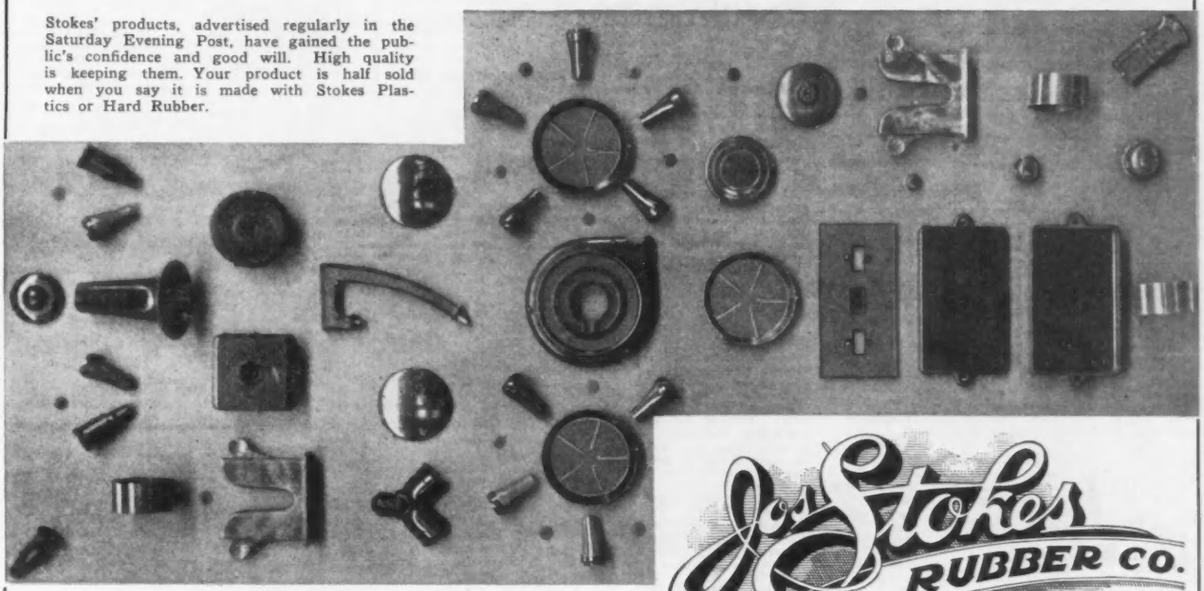

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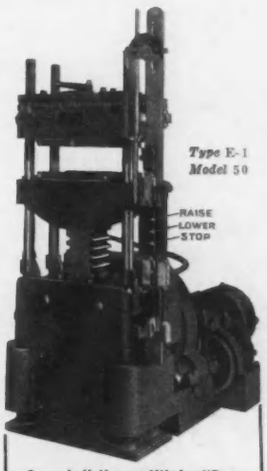

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Hubbard Spring Co., M. D., Pontiac, Mich.
Hunter Pressed Steel Co., Lansdale, Pa.
Idealite Lamp Shade Mfg. Co., 49-55 Fremont, Jersey City, N. J.
Jenkinson & Co., R. C., 293 Washington, Newark, N. J.
Jessnas Wire Specialty Wks., Crawfordsville, Ind.
Kircher's Mfg. Co., 355 Calyer, Brooklyn, N. Y.
Manhattan Wire Products Co., 393 First Ave., New York.
Mattatuck Mfg. Co., Waterbury, Conn.
Murray Hill Wire Frame Co., 314 E. 32nd, New York, N. Y
Roebling's Sons Co., John A., Trenton, N. J.
Steinen & Co., 297 Washington, Newark, N. J.
Watral & Sons, 133 E. 16th, New York, N. Y.
Young Industries, Inc., L. A., Detroit, Mich.
FRAMES, Wire. See Forms, Wire.
FRICTION TAPE. See Tape, Rubber and Friction.
FRINGE. Chandelier. See Crystals, Chandelier.

FUSE CLIPS

Sherman Mfg. Co., H. B., Battle Creek, Mich.
Waterbury Brass Goods Co., Waterbury, Conn.
FUSE PLUG SCREW SHELLS. See Shells, Screw Socket.
FUSE TESTERS. See Testers, Fuse and Circuit.

FUSES AND FUSE WIRE

KEY
Cartridge ..... See C
Plug ..... See P
Non-Refillable ..... See N
Refillable ..... See R
Open Link ..... See O
Fuse Wire ..... See O

Acme Elec. & Mfg. Co., Canal & Hamilton Ave., Trenton, N. J. ..... P . . . . .
Aluminum Co. of America, 2144 Oliver Bldg., Pittsburgh, Pa. ..... O
Arzimes. See Economy Fuse Mfg. Co.
Automatic Elec. Iron & Fuse Co., 215 S. American, Philadelphia, Pa ..... P . . . . .
Bryant Elec. Co., 1421 State, Bridgeport, Conn.
Buss. See Bussman Mfg. Co.
Bussmann Mfg. Co., University & Jefferson Ave., St. Louis ..... C P N R O
Chase-Shawmut Co., Newburyport, Mass. .. C P N R O
C-E-Z. See Bryant Elec. Co.
Clearite. See Economy Fuse & Mfg. Co.
Clear-Top. See Trico Fuse Mfg. Co.
Colortop. See Trico Fuse Mfg. Co.
Colt's Patent Fire Arms Mfg. Co., Hartford, Conn. (Automobile) ..... C . . N R . .
Commercial Enclosed Fuse Co., 1317 Willow Ave., Hoboken, N. J. ..... C P N . . .
Cons Bros. Mfg. Co., 183 W. Lake, Chicago C P . . R . .
Crystal. See Royal Elec. Co.
Daum Fuse & Elec. Mfg. Co., 1157 Hedgkiss, Pittsburgh ..... C . . . . R . .
D. & W. See Graybar Electric Co.
Eagle Electric Mfg. Co., Inc., 49 Hall, Brooklyn, N. Y. ..... P . . . . .
Economy Fuse & Mfg. Co., 2717 Grenview Ave., Chicago, Ill. ..... C P N R . .
Eco. See Economy Fuse & Mfg. Co.
Electric Fuseguard Co., Charlottesville, Va.. C P N R . .
Elliott Electric Co., Shreveport, La. ..... .
Gem. See Jefferson Elec. Co.
General Elec. Co., Merchandise Dept., Bridgeport, Conn. ..... C P N R . .
Graybar Electric Co., Graybar Bldg., Lexington Ave. and 43rd St., New York, N. Y. C . . . . . .
Great Western Fuse Co., 415 Lexington Ave., New York, N. Y. ..... R . .
H. & H. See Hart & Hegeman.
Hudson Wire Co., Ossining, N. Y. ..... O
Jefferson Electric Co., 1505 W. 15th, Chicago, Ill. ..... C P N R O
Kantark. See Trico Fuse Mfg. Co.
Kirkman Engrg. Co., 1 Dominick St., New York, N. Y. ..... C P N . . O
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National. See Economy Fuse & Mfg. Co.
Newark. See Colt's Patent Fire Arms Mfg. Co.
Pierce Renewable Fuses, Inc., 752 Main, Buffalo, N. Y ..... C P . . R . .
Platt Bros. & Co., Waterbury, Conn. ..... O
Powell, F. W., 119 W. Ohio, Pittsburgh ... P . . R . .
Pyrotite. See Bryant Electric Co.
Gee-Nu-It Elec. Co., New Bedford, Mass.. C P . . R . .
Rochester Re-Fill Fuse Co., 402 Cottage, Rochester, N. Y. ..... C . . . . R . .
Royal Elec. Co., Chelsea Station, Boston. . P N . . . .
Seco. See U. S. Electric Co.
Shawmut. See Chase-Shawmut Co.
Simplicity. See Cote Bros. Mfg. Co.
Six-In-One. See Industrial Engrg. Co.
Star Fuse Co., 235 Canal, New York, N. Y. C P . . R . .

Trico Fuse Mfg. Co., 1001 McKinley Ave., Milwaukee ..... C P N R . .
Union. See Jefferson Elec. Co.
U.S. Electric Co., 20 Chambers, Trenton, N.J. .. P . . . . .

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Cattie & Bros., Joseph P., Gaul and Lotterly Sts., Philadelphia, Pa.
GALVANOMETERS. See Instruments, Laboratory Standard.

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Helium Co., Louisville, Ky.
Palatine Industrial Co., 111 Fifth Ave., New York, N. Y.
Weber, Alfred, 5 Union Square, New York, N. Y.
GAS SIGN ELECTRODES. See Electrodes for Gas Signs

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Canfield Rubber Co., Bridgeport, Conn
Wrigley Bros., 356 W. 18th, New York, N. Y.
GAUZE BRUSHES, Wire. See Brushes, Commutator.
GEARS, Fibre. See Gears and Pinions, Composition.

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De Laval Steam Turbine Co., Trenton, N. J.
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Grant Gear Works, Boston, Mass.
James Mfg. Co., D. O., Chicago, Ill.
Janette Mfg. Co., 556 W. Monroe, Chicago, Ill.
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Lewellen Mfg. Co., Columbus, Ind.
Lupe, W. C., Syracuse, N. Y.
Nuttall Wks., of Westinghouse Elec. & Mfg. Co., McCandless Ave. & Harrison St., Pittsburgh, Pa.
Palmer-Bee Co., Detroit, Mich.
Ohio Gear Co., 1336 E. 179th, Cleveland, Ohio.
Perkins Machine & Gear Co., 125 Circuit Ave., Springfield, Mass.
Philadelphia Gear Works, Richmond and Tioga Sts., Philadelphia, Pa.
Smith, Winfield H., Springville, N. Y.

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Colburn Gear & Mfg. Co. (Norfolk Downs), Quincy, Mass.
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Foote Bros. Gear & Machine Co., 215 N. Curtis, Chicago.
Franklin Fibre Specialty Co., Wilmington, Del.
General Electric Co., Schenectady, N. Y.
Micarta. See Westinghouse Elec. & Mfg. Co.
National Vulcanized Fibre Co., Wilmington, Del.
Ohio Gear Co., 1336 E. 179th, Cleveland, Ohio.
Perkins Machine & Gear Co., 125 Circuit Ave., Springfield, Mass.
Stahl Gear & Machine Co., 1390 E. 40th, Cleveland, Ohio.
Stranahan Gear Co., Philadelphia, Pa.
Textolit. See General Electric Co.
Textolite. See General Electric Co.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

GEARS AND PINIONS, Iron and Steel

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Earle Gear & Machine Co., Wayne Junction, Philadelphia.
Falk Corp., Milwaukee, Wis.
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Grant Gear Works, Boston, Mass.
James Mfg. Co., D. O., Chicago, Ill.
Modart Co., St. Louis, Mo.
Meisel Bros. Mfg. Co., 944 Dorchester Ave., Boston, Mass.
Ohio Gear Co., 1336 E. 179th, Cleveland, Ohio.
Perkins Machine & Gear Co., 125 Circuit Ave., Springfield, Mass.
Permag. See Perkins Machine.
Tool Steel Gear & Pinion Co., Cincinnati, Ohio.

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Gerdes & Co., 30 Church, New York, N. Y.
Syracuse Rawhide Mfg. Co., Syracuse, N. Y.
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Pyrex. See Corning Glass Wks.

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Forger & Co., A. H., 2414 E. 58th, Los Angeles, Cal.
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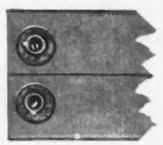

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Steimer, Doran & Rowe, 336 Fourth Ave., Pittsburgh, Pa. "Radax."
United Novelty Glass Mfg. Co., 121 Prince, New York, N. Y.
Wells Glass Co., Kokomo, Ind. "Daylite."
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Royal Enamel Co., Fitchburg, Mass.
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Stratton Mfg. Co., Stratton, Maine.
Strombeck-Becker Mfg. Co., Moline, Ill.
Sun Enamel Wks., Leominster, Mass.

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Hold-Heet. See Russell Electric Co.
Russell Electric Co., 384 W. Huron, Chicago, Ill.
HOLDERS, Brush. See Brushes, Commutator.
HOT WIRE METERS. See Instruments, Portable and Switchboard.
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IMPREGNATING, VACUUM. See Ovens, Industrial.
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Elinco. See Electric Indicator Corp.
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INSTRUMENTS, Laboratory Standard. See Instruments, Laboratory Standard.
INSTRUMENTS, Portable Testing. See Instruments, Portable and Switchboard; also Instruments, Pocket.

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Argco Laboratories, Inc., 150 W. 22nd, New York, N. Y.
Arco Bros., 3640 N. Second, Philadelphia, Pa.
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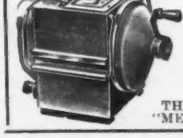

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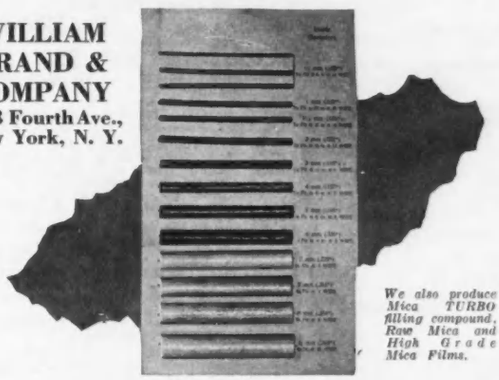

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INSTRUMENTS, Laboratory—Continued
Chicago Apparatus Co., 1735 N. Ashland Ave., Chicago, Ill.
Delta-Star Elec. Co., 2437 Fulton, Chicago, Ill.
Leeds & Northrup Co.
General Electric Co., Schenectady, N. Y.
Gray Instrument Co., 64½ W. Johnson, Philadelphia, Pa.
Hickok Elec'l Instrument Co., 10514 Dupont, Cleveland, O.
Jagabi. See Biddle, James G.
Jewell Elec. Instrument Co., 1650 Walnut, Chicago, Ill.
Kasson. See Rawson Elec'l. Instrument Co.
Kelvin. See Leeds & Northrup Co.
Kohlrausch. See Leeds & Northrup Co.
Leeds & Northrup Co., 4901 Stenton Ave., Philadelphia, Pa.
Milvay. See Chicago Apparatus Co.
Osiso. See Westinghouse Electric & Mfg. Co.
Rawson Elec'l Instrument Co., Cambridge, Mass.
Roller-Smith Co., 220 Broadway, New York, N. Y.
Rubicon Co., 29 N. Sixth, Philadelphia Pa. (Wheatstone Bridges, Galvanometers, Inductance Condensers, Potentiometers, Resistance Boxes, Permeameters.)
Simplex. See Leeds & Northrup Co.
Strobatchy. See Argco Laboratories, Inc.
Stromberg Electric Co., 223 W. Erie, Chicago, Ill.
Thompson-Levering Co., 351 N. 37th St., Philadelphia, Pa.
Unipivot. See Rawson Elec'l Inst. Co.
Vreeland Apparatus Co., 140 Cedar, New York, N. Y. (Sine Wave Oscillators.)
Westinghouse Electric & Mfg. Co., Newark, N. J.
Weston Elecl. Instrument Corp., 583 Frelinghuysen Ave., Newark, N. J.

INSTRUMENTS, Pocket

Advance. See Eldredge Elec'l Corp.
Adbro Mfg. Co., 927 French, Pittsburgh, Pa.
Eclipse. See Eldredge Elec'l Corp.
Eldredge Elec'l Corp., 3 P. O. Sq., Springfield, Mass.
Heyer Products Co., 197 Grove, Bloomfield, N. J.
Ideal Instrument Co., Penacook, N. H.
Jewell Elec. Instrument Co., 1650 Walnut, Chicago, Ill.
Kellogg Switchboard & Supply Co., 1066 W. Adams, Chicago, Ill.
Lundquist Tool & Mfg. Co., Worcester, Mass.
Milavolt. See Adbro Mfg. Co.
Readrite Meter Works, 7 College Ave., Bluffton, Ohio.
Roller-Smith Co., 220 Broadway, New York, N. Y.
Shire Elec. Products Co., Marquette Bldg., Detroit, Mich.
Sholder-Excel Mfg. Co., Clyde, Ohio.
Square D Company, Detroit, Mich.
Sterling Mfg. Co., 2831 Prospect Ave., Cleveland, Ohio.
Weston Elecl. Instrument Corp., 583 Frelinghuysen Ave., Newark, N. J.
Wigginton. See Square D Company.
Yankee. See Lundquist Tool Mfg. Co.

INSTRUMENTS, Portable and Switchboard

This heading includes all standard, portable and switchboard types, measuring and testing instruments—ammeters, voltmeters, wattmeters, ohmmeters, cable testers and fault-finders.
See Also Instruments, Pocket; Also Instruments, Laboratory Standard.
Argco Laboratories, Inc., 150 W. 22nd, New York, N. Y.
Beat Bros., 421 Sedgley Ave., Philadelphia, Pa.
Beede Instrument Co., Penacook, N. H.
Biddle, James G., 1209 Arch, Philadelphia, Pa.
Brown Instrument Co., Wayne and Windrim Sts., Philadelphia, Pa.
Cambridge Instrument Co., Grand Central Terminal, New York, N. Y.
Century Elecl. Co., 100 Randall Ave., Syracuse, N. Y.
Dongan Electric Mfg. Co., 2985 Franklin, Detroit, Mich.
Eastern Specialty Co., 3551 N. Fifth, Philadelphia, Pa.
Electric Heat Control Co., 5902 Carnegie Ave., Cleveland, O.
(Radio Condenser Test Set.)
Electric Mfg. Co., 966 Mission, San Francisco, Cal.
Esterline-Angus Co., Speedway, Indianapolis, Ind.
Fidelity Electric Co., Lancaster, Pa.
Fisher Cable Test Sets. See Leeds & Northrup.
Fore Elecl. Mfg. Co., 5258 Wabada Ave., St. Louis, Mo.
Freyn Engrg. Co., 310 S. Michigan Ave., Chicago, Ill.
General Electric Co., Schenectady, N. Y.
General Radio Co., Cambridge, Mass.
Gray Instrument Co., 64½ W. Johnson, Philadelphia, Pa.
Ground-Ohmer. See Sticht & Co.
Handy. See Weinberg & Co.
Heyer Products Co., 197 Grove, Bloomfield, N. J.
Hickok Elecl. Inst. Co., 10514 Dupont, Cleveland, O.
Hoyt Elecl. Inst. Wks., 857 Boylston, Boston, Mass.
I T L. See Illinois Testing Laboratories.
Jewell Elec. Instrument Co., 1650 Walnut, Chicago, Ill.
King. See Electric Heat Control Co.
Leeds & Northrup Co., 4901 Stenton Ave., Philadelphia, Pa.
Master. See Jewell Elecl. Instrument Co.
M. D. C. See Metropolitan Devices Corp.
Megger Testing Sets. See Biddle.
Metropolitan Devices Corp., 1250 Atlantic Ave., Brooklyn.
Multi-Volt Trouble Finder. See Weiford, Jr., Geo. W.
Nagel Elecl. Co., W. G., 23 St. Clair, Toledo, Ohio.
Norton Elecl. Inst. Co., 81 Hilliard, Manchester, Conn.
Paneltest Meters. See Beede Instrument Co.
Pearless Meters. See Thompson-Levering Co.
Pier Equipment Mfg. Co., Benton Harbor, Mich.
Pin-Jack. See Weston Elec'l Instrument Co.
Price Hollister Co., Rockford, Ill.
Queen. See Gray Instrument Co.
Rawson Elecl. Inst. Co., Cambridge, Mass.
Roller-Smith Co., 220 Broadway, New York, N. Y.
Sangamo Elec. Co., Springfield, Ill.
Shortfinder. See Eisemann Shortfinder Co.
Standco. See Sticht Co., H. H.
States Co., Hartford, Conn.
Sterling Mfg. Co., 2831 Prospect Ave., Cleveland, Ohio.
Stewart Bros., Ottawa, Ill.
Sticht & Co., H. H., 13 Park Row, New York, N. Y.
Tanner Engrg. Co., Rawson St. and Nelson Ave., Long Island City, N. Y.
Test-A-Bat. See Beede Instrument Co.
Thompson-Levering Co., 351 N. 37th, Philadelphia, Pa.
Thomson. See General Electric Co.
Triplex Meters. See Roller-Smith Co.
3 in 1. See Sticht & Co., H. H.
Two-in-One. See Stitcht Co., Herman H.
United States Gauge Co., 44 Beaver, New York, N. Y.
Utility. See Esterline-Angus Co.
Westinghouse Electric & Mfg. Co., Newark, N. J.
Weston Elecl. Instrument Corp., 583 Frelinghuysen Ave., Newark, N. J.

INSULATION (Insulating) (Insulators)
Beads. See Beads, Insulating.
Canopy. See Insulators, Canopy.
Cloth. See Cloth & Paper.
Composition. See Molded Insulation.
Compound. See Wax and Comp.
Fibre. See Fibre.
Lava. See Cores, Resistance Coil.
Marble. See Slate.
Mica. See Mica.
Molded. See Molded Insulation.
Paint. See Paint, Varnish, Laquer.
Paper. See Cloth and Paper Insulating.
Phenolic. See Fibre, Phenol. Also Molded Insulation.
Porcelain. See Porcelain.
Rod. See Rubber, Hard.
Rubber. See Rubber, Hard.

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Sealing Wax. See Wax and Compounds.
Slate. See Slate.
Soapstone. See Soapstone.
Tubing. See Tubing, Varnished Fabrics.
Varnish. See Paint and Varnish.
Wax. See Wax and Compounds.
INSULATING MACHINES, WIRE. See Wire Manufacturing Machines.
INSULATING TUBING. See Tubing, Varnished Fabric; also Tubing, Rubber.

INSULATION CUTTERS

Arteo Engrg. Co., 115 Brown, Milwaukee, Wis.

INSULATION MIXERS

Baker Perkins Co., Saginaw, Mich.
INSULATION SHEARS. See Shears, Insulation.
INSULATION STRAINING MACHINES. See Wire Manufacturing Machines.
INSULATION TESTERS. See Instruments, Laboratory Standard.

INSULATORS, Canopy

Continental-Diamond Fibre Co., Bridgeport, Pa.
Franklin Fibre Specialty Co., Wilmington, Del.
General Electric Co., Schenectady, N. Y.
Macallen Co., Boston 27, Mass.
Wilmington Fibre Specialty Co., Wilmington, Del.
IRON CASTINGS. See Castings, Gray Iron.
IRONS, Soldering. See Soldering Irons.
JACKS, Armature. See Lifts, Armature.
JACKS, Radio. See Radio Receiver Parts.

JARS, Battery, Glass

For Composition Jars. See Molded Insulation; also Rubber.
Corning Glass Co., Corning, N. Y.
Cumberland Glass Mfg. Co., Bridgeton, N. J.
Gaynor Glass Works, Salem, N. J.
Gillinder & Sons, Inc., Philadelphia, Pa.
Hazel-Atlas Glass Co., Wheeling, W. Va.
Macbeth-Evans Glass Co., Dept. G, Eastern Division, Charleroi, Pa.
Rodefer Glass Co., Bellaire, O.
Sneath Glass Co., Hartford City, Ind.
United States Glass Co., 9th & Bingham, Pittsburgh, Pa.

JEWELS, Instrument Bearing

Bird, Richard H., Waltham, Mass.
Deknatel & Sons, J. A., Queens Village, N. Y.
Eastern Specialty Co., 3551 N. Fifth, Philadelphia, Pa.
Fisher, Thomas E., Penacook N. H.
Gatti, Inc., Aurele M., Liberty St. & Fairmount Ave. Trenton, N. J.
Mildrum Jewel Co., East Berlin, Conn.
Sapphire Products Co., 51 Chambers, New York, N. Y.
Universal. See Oefinger, J. L.
Wennstrom's Sons Co., John, Suffern, N. Y.
Worley Jewel Co., John, Waltham, Mass.

JOINTS, Fixture Insulating

Appleton Elec. Co., 1703 Wellington Ave., Chicago, Ill.
Macallen Co., Boston 27, Mass.
Sandow Tool Co., 1440 Broadway, New York, N. Y.
Sprecher Mfg. Co., P. W., 3220 North Ave., Milwaukee.
White Co., O. C., 15 Harmon, Worcester, Mass.
Wittenberg Bros., 60 Shipman, Newark, N. J.

LABORATORY (Laboratories.)

Ovens. See Ovens, Industrial & Laboratory.
Rheostats. See Rheostats.
Testing. See Testing.
LABORATORY STANDARD INSTRUMENTS. See Instruments, Laboratory Standard.
LACQUER, ARMATURE. See Paint, Varnish and Lacquer.
Metal. See Paint, Varnish and Lacquer.
LAMINATIONS. See Discs, Armature.
LAMP BASES. See Bases, Reading Lamp.
LAMP BULBS (Unfinished). See Bulbs, Glass.
LAMP FILAMENTS. See Filaments, Incandescent Lamp.
LAMP LEAD-IN WELDS. See Filaments, Incandescent Lamp.
LAMP MAKING MACHINES. See Machines, Lamp Making.
LAMP TESTING PHOTOMETERS. See Photometers, Lamp.

LATHES

(Special for use in Motor Repairing and Motor Mfg.—Test Bench Lathes).
Ajax Electric Co., Kalamazoo, Michigan.
Allen Electric & Equipment Co., Kalamazoo, Michigan
Cincinnati Lathe & Tool Co., 3207 Disney (Oakley) Cincinnati, Ohio.
Hobart Bros. Company, Troy, Ohio. (Test Bench).
South Bend Lathe Works, 425 E. Madison, South Bend, Ind.
Weidenhoff, Joseph, 4352 W. Roosevelt Rd., Chicago, Ill.
LAVA. See Cores, Resistance Coil.

LEAD

American Lead Co., 3112 Penn Ave., Pittsburgh, Pa.
Blatchford Co., E. W., 608 Dearborn, Chicago, Ill.
Columbia Smelting & Refining Wks., 365 West, New York, N. Y.
Eagle-Picher Lead Co., 134 N. LaSalle, Chicago, Ill.
Federated Metals Corp., Woolworth Bldg., New York, N. Y.
Jacobson & Son Co., I. M., 15304 Idaho, Detroit, Mich.
National Lead Co., 111 Broadway, New York, N. Y.
Raymond Lead Co., 735 S. Washtenaw Ave., Chicago, Ill.
Turner Lead Co., East St. Louis, Ill.
United Metals Selling Co., 25 Broadway, New York, N. Y.

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LEAD-IN WELDS, Lamp. See Filaments, Incandescent Lamp.
LEADS, FLEXIBLE (Commutator Brush). See Brushes.

LENSES

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See also Jewels, Instrument Bearing.
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B. B. T. Corp. of America, Atlantic Bldg., Philadelphia, Pa.
Corning Glass Wks, Corning, N. Y. (Flashlight and Signal.)
Deknatel & Sons, J. A., Queens Village, N. Y.
Electric Power Equipment Corp., 412 W. 18th, Philadelphia, Pa.
Elpeco. See Electric Power Equipment Corp.
Goerz American Optical Co., C. P., 317 E. 34th, New York.
Jefferson Glass Co., Follansbee, W. Va. (Sign and Flashlight.)
Kliegl Bros. Universal Stage Lig. Co., 321 W. 50th, New York, N. Y. (Condensing and Projector.)
Macbeth Evans Glass Co., Dept. G, Eastern Division, Charleroi, Pa. (Flashlight.)
North Light Corp., 30 W. 15th, New York, N. Y.
Popper & Sons, Leo, 147 Franklin, New York, N. Y.
Pyle National Co., 1334 N. Kostner Ave., Chicago, Ill.
Rochester Glass Products, Inc., 29 N. Water, Rochester, N. Y.
Rodefer Glass Co., Bellaire, O. (Flashlight.)
Sneath Glass Co., Hartford City, Ind. (Sign.)
Stromberg-Carlson Telephone Mfg. Co., Rochester, N. Y.

LETTERS, Sign

Glass. Metal.
Adsign Corp, 113 W. 63rd, New York, N. Y.
Chain Products Co., 3924 Cooper Ave., Cleveland, O. (Brass and White Metal.)
Chicago Miniature Lamp Co., 654 W. Lake, Chicago, Ill. (Raised Letters for Signs.)
Eradium. See Pioneer Corporation.
Federal Elec. Co., 8700 S. State, Chicago, Ill. (Metal.)
Grammes & Sons, Inc., L. F., Allentown, Pa.
Heralite. See Pressed Prism Plate Glass Co.
Koluz Glass Sales Co., Kokomo, Ind.
Lu-Mi-Nus Signs, Inc., 2736 Wentworth Ave., Chicago, Ill.
Manhattan Elecl. Supply Co., 510 Sixth Ave., New York, N. Y. (For Gas Signs.)
Opalite Corp., 301 E. Ohio, Chicago, Ill.
Pioneer Corporation, 8308 Yale Ave., Chicago. (Luminous.)
Pressed Prism Plate Glass Co., Chicago, Ill. (Glass.)

LIFTS, Armature

Lifts, Hoists, Jacks, Trucks, Buggies, Floor Cranes.
Columbia Machine Works & Malleable Iron Co., Atlantic Ave. & Chestnut St., Brooklyn, N. Y.
Duff-Norton Mfg. Co., Pittsburgh, Pa.
Electric Service Supplies Co., 17th & Cambria Sts., Philadelphia, Pa.
Peerless. See Electric Service Supplies Co.
Ridion Company, Frank, Boston, Mass.

LININGS, Socket

Remington Mfg. Co., 937 Barnum Ave., Bridgeport, Conn.
LOCK WASHERS. See Washers, Lock.
LOOP WINDERS & SPREADERS. See Winding Machines, Armature & Field Coil.
LOUD SPEAKER DIAPHRAGMS MATERIAL. See Cloth, Untreated; also Parchment Paper.

LOUD SPEAKERS

Manufacturers Units and Electric Pick-ups for Portable and Built-in Types.
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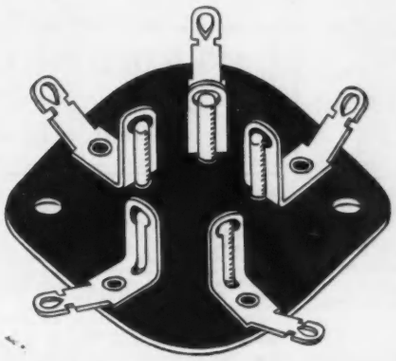
American Radio Products Corp., 149 Broadway, New York.
American Reproducers Co., 1204 Summit Ave., Jersey City, N. J.
A. R. C. See American Reproducers Co.
Amplion. See Woolf, J. W. & W. L.
Baritone Mfg. Co., 846 Jackson Blvd., Chicago, Ill.
Boudette Mfg. Co., 67 Crescent Ave., Chelsea, Mass.
Brooklyn Metal Stamping Corp., 730 Atlantic Ave., Brooklyn, N. Y. (Electric Pick-up.)
Cannonball. See Cannon & Miller Co.
Cannon & Miller Co., Springwater, N. Y.
Chelten Electric Co., 4859 Stenton Ave., Philadelphia, Pa.
Conamic. See Operadio Mfg. Co.
Decatur Mfg. Co., 45 Harman St., Brooklyn, N. Y.
Detroit Reproducers, Inc., Lafayette & Meldrum Sts., Detroit, Mich.
Duo-Lae. See F. & H. Radio Laboratories.
Electrical Research Laboratories, 2500 Cottage Grove Ave., Chicago, Ill. (Units.)
Empire United Hat Block Co., 312 E. 22nd, New York.
Engineers Service Co., 25 Church, New York, N. Y. (Kit.)
Enco. See Engineers Service Co.
Fenco Cone Co., 57 Murray, New York, N. Y. (Kit.)
Fidelity Radio Corp., Salt Lake City, Utah.
F. & H. Radio Laboratories, Fargo, N. D.
General Illuminating Co., 1101 Ocean P'kway, Brooklyn, N. Y.
Globe Technolian Corp., Reading, Mass.
G. R. P. See Penn Mfg. Co.
Grutzl Speaker Co., 606 E. Walnut, Des Moines, Iowa.
Jack Horner. See Operadio Mfg. Co.
Jensen Radio Mfg. Co., 6601 S. Lavanie Ave., Chicago, Ill.
Kersten Radio Equipment, Inc., 1415 Fillford, Kalamazoo, Mich.
Kyle. See Newcombe-Hawley.
Magnavox Co., 2130 Horton, Oakland, Cal. Also Units.
Mandel Electric Co., 2157 N. California Ave., Chicago, Ill.
Marconi Radio Mfg. Co., 303 Devoe, Brooklyn, N. Y. (Horn.)
Miles Mfg. Corp., 31 W. 21st, New York, N. Y.
Minuet. See Thompson Radio Co.
Newton Elec'l Mfg. Co., Newton, Mass.
O'Neil Mfg. Corp., West New York, N. J.
Operadio Mfg. Co., St. Charles, Ill.
Peerless. See United Reproducers Corp.
Philadelphia Storage Battery Co., Ontario & C Sts., Philadelphia, Pa.
Philco. See Philadelphia Storage Battery Co.
Platter Cabinet Co., North Vernon, Ind.
Powerola. See Temple Corp.
Puropower. See Platter Cabinet Co.
Quam Radio Products Co., Div. of United Air Cleaner Corp., 9705 Cottage Grove Ave., Chicago, Ill.
Racon Elec. Co., 18 Washington Place, New York, N. Y. (Horn only.)
Red Lion Cabinet Co., Red Lion, Pa.
Sonochorde. See Boudette Mfg. Co.
Stromberg-Carlson Tel. Mfg. Co., Rochester, N. Y.
Swoboda Co., Maritime Bldg., Seattle, Wash.
Thompson Radio Co., 25 Church, New York, N. Y.
Ultratone Mfg. Co., 1046 W. Van Buren, Chicago, Ill.
Universal. High Power Telephone Co., Carleton Ave. and Eddy, Seattle, Wash.
Utah Radio Products Co., 1615 S. Michigan Ave., Chicago, Ill. (Also Piano Unit.)
Utona. See American Radio Products Corp.
Victor Radio Corp., 4321 N. Western Ave., Chicago, Ill.
Wondrphone. See Universal High-Power Telephone Co.
Woolf, J. W. & W. L., 133 W. 21st, New York, N. Y.
Wright-De Coster, Inc., St. Paul, Minn.

LUGS, Copper

Anderson Mfg. Co., Albert & J. M., 289 A St., Boston
Dante Elecl. Mfg. Co., Bantam, Conn.
French Mfg. Co., Waterbury, Conn.

ANNOUNCING



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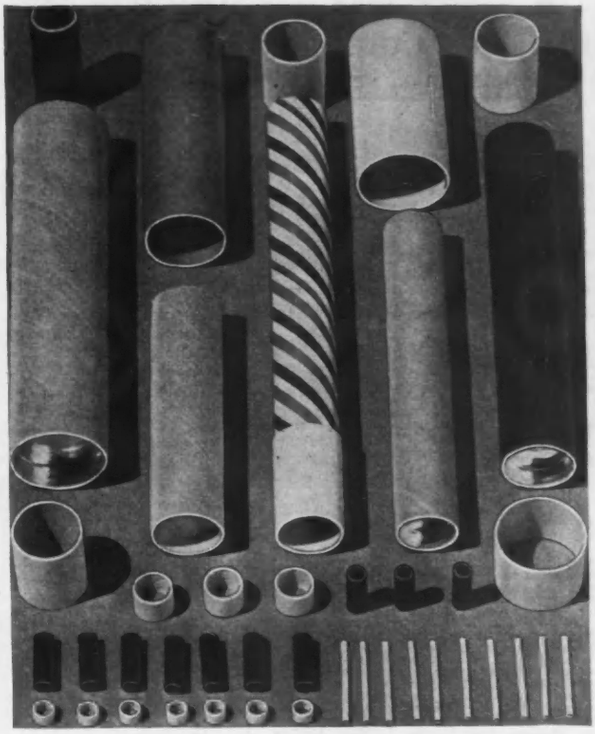

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KEY
Luminous Compound .....See C
Pendants (Bulbs) .....See P
Standard Parts .....See S

Acornlite Studios, 675 *2nd, Brooklyn, N. Y..... P
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Connecticut Elec. Mfg. Co., Bridgeport, Conn..... S
Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee, Wis
Eagelite. See Eagle Elec. Mfg. Co.
Eagle Elec. Mfg. Co., 79 Hall, Brooklyn, N. Y..... P
General Elec. Co., Merchandise Dept., Bridgeport, Conn. ..... S P
Glo-Guide. See Bryant Elec. Co.
Glow Lite. See Rodale Mfg. Co.
Hubbell, Inc., Harvey, Bridgeport, Conn..... P
Luma & Luma Lite. See Radium Dial Co.
Radieye. See General Electric Co.
Radium Dial Co., 3532 Forbes, Pittsburgh, Pa.... C P
Reynolds Spring Co., Jackson, Mich..... S
Rodale Mfg. Co., 200 Hudson, New York, N. Y..... P
Seelite. See T. C. Smith & Co.
Smith & Co., T. C., 3915 Powelton Ave., Philadelphia P
Undark. See United States Radium Corp. and Bryant Elec. Co.
United States Radium Corp., 535 Pearl, New York, N. Y. ..... C S P
MACHINE SCREWS. See Screws, Machine.
MACHINE SCREW PRODUCTS. See Screw Machine Products.

MACHINES

Armature Banding. See Banding Machines, Armature.
Armature Notching. See Notching Machines, Armature.
Balancing. See Balancers, Armature.
Banding. See Banding Machines, Armature.
Cable Armoring. See Wire Manufacturing Machines.
Coil Shaping. See Shaping Machines, Coil.
Coil Taping. See Taping Machines, Coil.
Coil Winding. See Winding Machines.
Commutator Slotting. See Mica Undercutters.
Engraving. See Engraving Machines.
Incandescent Lamp Making. See Machines, Lamp Making
Molded Insulation. See Presses, Molded Insulation.
Perforating. See Perforating Machines.
Porcelain Molding. See Presses, Porcelain Molding.
Radio Tube. See Machines, Lamp Making.
Shaping. See Shaping Machines, Coil.
Slotting. See Mica Undercutters.
Soldering. See Soldering Machines, Commutator.
Spring Making. See Spring Making Machines.
Taping. See Taping Machines, Coil.
Tension. See Tension Machines, Band Wire.
Winding. See Winding Machines.
Wire, Armoring. See Wire Manufacturing Machines.
Wire Drawing. See Wire Drawing Machinery.
Wire Insulator. See Wire Manufacturing Machines.
Wire Measuring. See Wire Manufacturing Machines
Wire Tension. See Tension Machines, Band Wire.
Wire Wrapping. See Wire Wrapping Machines.

MACHINES, Lamp Making

For Making Incandescent Lamps and Vacuum Tubes.
Argco Laboratories, Inc., 150 W. 22nd, New York, N. Y.
Arrow Mfg. & Machine Co., North Bergen, N. J.
Berrenberg, R., 13 Farnham (Roxbury), Boston, Mass (Vacuum Pumps.)
Czerwenka, Frank, 35 Monroe, Passaic, N. J. (Bombarding Machines.)
Eisler Electric Corp., 770 S. 13th, Newark, N. J.
General Engineering & Supply Co., 160 5th Ave., New York N. Y. (Filament Winder.)
Gesco. See General Engineering & Supply Co.
International Machine Wks., 527 32nd, Union City, N. J.
Rhason Mfg. Co., 124 45th, Union City, N. J.
Steeper & Hartley, Inc., Worcester, Mass.
York Elec. & Machine Co., 30 Penn, York, Pa.
MACHINES, Bombarding. See Machines, Lamp Making.
MACHINES, Pleating and Fluting. See Pleating Machines.
MACHINES, Spring Making. See Spring Making Machines
MACHINES, WIRE MANUFACTURING. See Wire Manufacturing Machines.
MAGNET CHARGERS. See Chargers, Magnet.
MAGNET STEEL. See Steel, Magnet.
MAGNET TESTERS. See Instruments, Portable and Switchboard; also Instruments, Pocket.
MAGNET WIRE MACHINES. See Enameling Machines for Magnet Wire.
MAGNETIC CHUCKS. See Chucks, Magnetic.
MAGNETIC CLUTCHES. See Clutches, Magnetic.
MAGNETOMETERS. See Instruments, Pocket.

MAGNETS, Permanent

Bulleas Co., D. K., Pottstown, Pa.
Ind. Steel Products Co., 4545 S. Western Blvd., Chicago
Rogers Drop Forging Co., Worcester, Mass.
Stromberg-Carlson Tel. Mfg. Co., Rochester, N. Y.
Thomas & Skinner Steel Products Co., 1102 E. 23rd, Indianapolis, Ind.
Valley Appliances, Inc., 634 Lexington Ave., Rochester, N. Y.

MALLETS, Raw Hide

Chicago Rawhide Mfg. Co., 1312 Elston Ave., Chicago, Ill
Crude Pelt. See Chicago Rawhide Mfg. Co.
Holbrook Raw Hide Mfg. Co., 748 N. Main, Providence, R. I
MANGANESE, Battery. See Chemicals, Battery.

MARKERS AND STAMPERS, Metal

Schmidt, Inc., Geo. T., 4102 Ravenswood Ave., Chicago, Ill.
MEASURING INSTRUMENTS. See Instruments.
METAL CUTTING OUTFITS. See Welding and Cutting
MECHANICAL RUBBER GOODS. See Rubber Mechanical Goods.
MEGOHMMETERS. See Instruments, Laboratory Standard

MELTING POTS AND LADLES, SOLDER, ETC.

Dunco. See Struthers Dunn, Inc.
Struthers Dunn, Inc., 138 N. Juniper, Philadelphia, Pa.
MERCURY SWITCHES. See Switches, Mercury.
METAL CLEANERS (Compound). See Cleaners, Metal. Outfits.
METAL FINISHING. See Plating & Finishing.
METAL MARKING OUTFITS. See Engraving Machines.
METALLIC SHADES. See Shades, Metallic.
METERS. See Instruments.
MICA SHADES. See Shades, Mica.
MICA TAPE. See Tape, Mica.
MICA UNDERCUTTERS. See Slotting Machines & Tools. Commutator.

MICA

Asheville Mica Co., Biltmore, N. C.
Atco. See Schoonmaker Insulation Co.
Brand & Co., William, 276 Fourth Ave., New York, N. Y.
Chicago Mica Co., 345 Campbell, Valparaiso, Ind.
Colonial Mica Co., 136 Seventh, Jersey City, N. J.
Ford Radio & Mica Corp., 113 Bleecker, New York, N. Y.
Gerdau Co., Otto, 533 Canal, New York, N. Y.
Gillespie-Rogers-Pyatt Co., Inc., 99 John, New York, N. Y.
Hirsch Mica Co. 1087 Flushing Ave., Brooklyn, N. Y.
Hoyt, Inc., Philip S., Las Tablos, New Mexico.
Huse-Liberty Mica Co., 73 Long Wharf, Boston, Mass.
International Mica Co., 3860 Brandywine, Philadelphia, Pa
Kant Krack. See Huse Liberty Mica Co.
Keene Mica Co., Keene, N. H.
Macallan Co., Boston 27, Mass.
Micabond. See Chicago Mica Co.
Mitchell-Rand Mfg. Co., 19 Vesey, New York, N. Y.
Miralite. See Mitchell-Rand Mfg. Co.
Mica Insulator Co., 200 Varick, New York, N. Y.
Mica Mfg. Co., 135 Johnson, Brooklyn, N. Y.
Micanite. See Mica Insulator Co.
Mica Products Mfg. Co., 54 Greene, New York, N. Y.
Munsell & Co., Eugene, 200 Varick, New York, N. Y.
Nemco. See New England Mica Co.
New England Mica Co., Waltham, Mass.
New England Minerals, Inc., 85 Devonshire, Boston, Mass
New York Mica & Mfg. Co., Auburn, N. Y.
Peerless. See New England Mica Co.
Prestonite. See Robt. K. Preston Mica Co.
Preston Mica Co., Robt. K., 957 Monadnock Blk., Chicago (Ground Mica.)
Red Streak. See Huse Liberty Mica Co.
Schoonmaker Insulation Co., A. O., 24 University Place, New York, N. Y.
Sterrs Mica Co., 11 Park Place, New York, N. Y.
Tar Heel Mica Co., Plumtree, N. C.
Watson Bros., 170 Purchase, Boston, Mass.
MINIATURE SWITCHBOARD SYSTEMS. See Instruments, Portable and Switchboard.
MIXERS, INSULATION. See Insulation Mixers.

MOLDED

Presses. See Presses, Molded Insulation.
Radio Parts. See Radio Molded Parts.
Shades. See Molded Insulation.

MOLDED INSULATION

Atco. See American Insulator Corp.
Aladdinite Co., Orange, N. J. (Caseine.)
Allen & Hills, Inc., Auburn, N. Y.
Ambler Asbestos Shingle & Sheathing Co., Ambler, Pa. (Cold.)
Amblerold. See Ambler Asbestos Shingle & Sheathing Co.
American Insulator Corp., New Freedom, Pa.
American Machine & Foundry Co., 5529 Second Ave., Brooklyn N Y
American Record Corp., Scranton, Pa.
Amerine. See American Insulator Corp.
Auburn Button Wks., 48 Canoga, Auburn, N. Y.
Bakelite Corp., 247 Park Ave., New York, N. Y.
Bay State Moulding Co., 1197 Dorchester Ave., Boston.
Beatsol Corp., 30 Littleton Ave., Newark, N. J.
Belden Mfg. Co., 4833 W. Van Buren, Chicago, Ill.
Beldenmold. See Belden Mfg. Co.
Bell Mfg. Co., 11 Elkins, Boston, Mass. Radio Parts.
Bettle. See Synthetic Plastics Co., Inc.
Boonton Molding Co., 300 Myrtle Ave., Boonton, N. J.
Boonton Rubber Mfg. Co., 223 Fanny Rd., Boonton, N. J.
Brewlite Moulding Corp., 109 Hudson, Jersey City, N. J (Wood Composition.)
Celluloid Corp., 10 E. 40th, New York, N. Y.
Cepco. See Monowatt Corp.
Cetec. See Monowatt Corp.
Cetelite. See Monowatt Corp.
Coltrock. See Colt's Patent Firearms Mfg. Co.
Chicago Molded Products Co., 2144 Walnut, Chicago, Ill.

Moulders of Bakelite

a synthetic resin

BOONTON MOULDING CO.

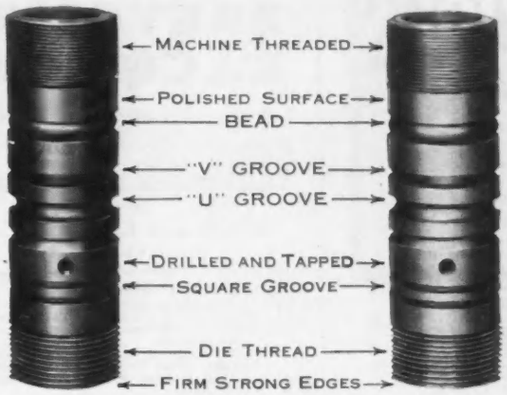
300 Myrtle Ave.,

BOONTON, N. J.

Cincinnati Molding Co., 2037 Florence Ave., Cincinnati, O.
Colasta Co., Hoosick Falls, N. Y.
Colt's Patent Fire Arms Mfg. Co., Hartford, Conn.
Compo-Site, Inc., 207 Astor, Newark, N. J.
Condensite. See Bakelite Corp.
Connecticut Elec. Mfg. Co., Bridgeport, Conn.
Continental-Diamond Fibre Co., Bridgeport, Pa.
Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee.
Dayton Insulating Molding Co., 434 E. First, Dayton, Ohio.
Diemoulding Production Co., Canastota, N. Y.
Dimec. See Dayton Insulating Moulding Co.
Durez. See General Plastics, Inc.
Electrical Insulation Corp., 308 W. Washington, Chicago, Ill.
Electrose. See Insulation Mfg. Co.
Erinoid Co., Park Row Bldg., New York, N. Y.
Evercool. See Bakelite Corp.
Formica Insulation Co., 4638 Spring Grove Ave., Cincinnati
Garfield Mfg. Co., Garfield, N. J. Composition. (Cold.)
General Electric Co., Schenectady, N. Y.
General Moulded Composition Co., 212 Market, Lynn, Mass.
General Plastics, Inc., 49 E. Walck Rd., N. Tonawanda, N. Y.
Grotelite Co., Grandview & Lafayette Aves., Bellvue, Ky
Gummor. See Garfield Mfg. Co.
Hann Mfg. Co., Harry W., 623 S. San Pedro, Los Angeles, Cal.
Herculite. See Colosta Co.
Hi-Heet. See Insulation Mfg. Co.
Imperial Molded Products Co., 2925 W. Harrison, Chicago.
Improco. See Insulation Products Co.
Inda. See American Machine & Foundry Co.
Insulation Mfg. Co., New York Ave. and Herkimer St. Brooklyn, N
Insulation Products Co., 404 Richland, Pittsburgh, Pa.
International Insulating, Division of General Industries Co., Syria, Ohio.
Karolith Corp., 2125 44th Rd., Long Island City, N. Y. (Casein plastics.)
Kellite. See Kellogg Switchboard & Supply Co.
Kellogg Switchboard & Supply Co., 1066 W. Adams, Chicago, Ill.
Klages, Chas., 128 147th, Ozone Park, N. Y.
Kuhn & Jacob Machine & Tool Co., 502 Prospect Ave., Trenton, N. J.
Kurz-Kasch Co., Dayton, O.
Lacanite. See Scranton Button Co.
Luco Products Corp., 40 Flatbush Ave. Extension, Brooklyn, N. Y.
Lumarith. See Celluloid Corp.
Luxite. See Wilbur & Williams Co.
Macallen Co., Boston, 27, Mass.
Mack Molding Co., Wayne, N. J.
Makalot. See Johnson Molding & Tool Co.
Megohom. See Waterbury Button Co.
Micarta Fabricators, Inc., 309 Canal, New York, N. Y.
Micarta. See Westinghouse Elec. & Mfg. Co.
Mica. See Molded Insulation Co.
Modern Molded Products Co., Blount and Elm Sts., Providence, R. I.
Molded Insulation Co., Mt. Vernon, N. Y.
Monowatt Electric Corp., 24 W. 40th, New York, N. Y.
New England Products Co., 232 Greenwich, New York, N. Y.
Niagara Insul-Bake Specialty Co., 483 Delaware Ave., Albany, N. Y.
Noark. See Colt's Patent Fire Arms Mfg. Co.
Norloc. See Norton Laboratories, Inc.
Northern Industrial Chemical Co., 11 Elkin, South Boston.
Norton Laboratories, Inc., Div. 83, Lockport, N. Y.
Panelyte Corp., Trenton, N. J.
Paramix. See Spilitdorf Radio Corp.
Paratherm. See Scranton Button Co.
Phenolite. See Scranton Button Co.
Plastic Molding Corp., Sandy Hook, Conn. (Cold.)
Plymouth Mfg. Co., 2148 Walnut, Chicago, Ill.
Pollopas. See Wilbur & Williams.
Pruven Composition Products Corp., Milford, Conn.
Pruvenite. See Pruven Composition Products Co.
Pyrolax. See Cutler-Hammer Mfg. Co.
Recto Mfg. Co., 23 W. 3rd, Cincinnati, O.
Redmonol. See Bakelite Corp.
Rexlite. See Northern Industrial Chemical Co.
Reynolds Spring Co., Jackson, Mich.
Reynoldite. See Reynolds Spring Co.
Reynomold. See Reynolds Spring Co.
Richardson Co., Lockland, Cincinnati, O.
Ridgelite See Ridgley Trimmer Co.
Ridgley Trimmer Co., Springfield, O.
Schneider Bros., Inc., 312 N. Sheldon Ave., Chicago.
Shaw Insulator Co., Irvington, Newark, N. J.
Siemon Co., State and Dewey, Bridgeport, Conn.
Specialty Insulation Mfg. Co., Hoosick Falls, N. Y.
Star Insulate. See Insulation Mfg. Co.
Sterite. See Insulation Mfg. Co.
Stokes Rubber Co., Jos., Trenton, N. J.
Stokes & Smith Co., Summerdale Ave. near Roosevelt Blvd., Philadelphia, Pa.
Synthetic Plastic Co., Inc., 535 Fifth Ave., New York, N. Y. (Molding Powder).
Textolite. See General Elec. Co., also Electrical Insulation Corp.
Thermoplax. See Cutler-Hammer Mfg. Co.
Tegrit. See Garfield Mfg. Co.
Union Insulating Co., Parkersburg, W. Va.
Vulcabeston. See Colt's Patent Fire Arms Mfg. Co.
Vulcanized Rubber Co., 251 Fourth Ave., New York, N. Y.
Waterbury Button & Moulding Co., Waterbury, Conn.
Watertown Mfg. Co., Watertown, Conn.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa
Wilbur & Williams Co., 261 Park Square Bldg., Boston, Mass. (Molding Powder.)

MOLYBDENUM

American Electro Metal Corp., 65 Madison Ave., New York, N. Y.
Elkon, Inc. (Div. of P. R. Mallory Co.), 350 Madison Ave., New York, N. Y.
Fansteel Products Co., Inc., North Chicago, Ill.
Lohfeld & Co., J. L., 53 Park Place, New York, N. Y.
Palatine Industrial Co., 111 Fifth Ave., New York, N. Y.
Sirian Wire Co., 255 Sherman Ave., Newark, N. J.



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General Etching & Mfg. Co.
3072-82 W. Grand Ave. Chicago, Ill.

MONEL METAL
International Nickel Co., 67 Wall, New York, N. Y.
MOTOR CONTROLLERS. See Controllers, Motor.
MOTOR PLATFORM BASES. See Bases, Motor Platform.
MOTOR STARTERS. See Controllers, Motor; Switches, Remote Control; Switches, Motor Starting; Safety; Switches Snap (Heavy Duty).

MOTORS

Alternating Current	See S
Direct Current	See S
Motors, 1 Hp. up	See M
Motors Fractional Hp.	See F
Universal	See U

Autodector. See Roth Bros. Co., Div. of Century Electric Co.
Advance Elec. Co., 4311 Maple Ave., St. Louis M F S ..
Allis-Chalmers Mfg. Co., Milwaukee, Wis. M .. S ..
Allis Co., Louis, Milwaukee, Wis. M .. S ..
American Elec. Motor Co., Cedarburg, Wis. M .. .. ..
Apex Elec'l Mfg. Co., 1067 E. 152nd, Cleveland .. F S U
Armor Elec. Mfg. Co., 1020 Holland, Erie, Pa. M .. .. ..
Baldor Elec. Co., 4352 Duncan Ave., St. Louis M F S ..
B-Line. See Brown-Breckmeyer Co.
Bodine Elec. Co., 2256 W. Ohio, Chicago .. F S U
Bogue Elec. Co., Chas. J., 132 King, New York M .. .. ..
Brown-Breckmeyer Co., Norwood Power Bldg., Dayton, O. M F .. ..
Burke Elec. Co., Erie, Pa. M F S U
B. T. See Allis Co., Louis.
B & R Mfg. Co., 812 Lafayette, Toledo, O. .. F .. ..
Century Elec. Co., 1806 Pine, St. Louis, Mo.. M F S ..
Chandeysson Elec. Co., St. Louis, Mo. M .. S ..
Clark, Jr., Elec. Co., James, 600 E. Bergman, Louisville, Ky. M .. .. ..
Cleveland Armature Wks., 4753 St. Clair Ave., Cleveland, O. M .. S ..
Comet Elec. Co., 47 Union Trust Bldg., Indianapolis, Ind.
Continental Elec. Co., 14 Magazine, Newark.. M .. S ..
Crocker-Wheeler Elec. Mfg. Co., Ampere, N. J. M .. S U
Cushman Elec. Co., Concord N. H. M F S ..
Diehl Mfg. Co., Elizabeth, N. J. M F S ..
Diverter Pole. See Rochester Elec. Product Co.
Domestic Electric Co., Kent, O. .. .. S U
Dumore Co., 35 16th, Racine, Wis. .. F .. U
Eclipse. See Fidelity Elec. Co.
Edco. See Electro Dynamic Co.
Electric Machinery Co., Minneapolis, Minn.. M .. S ..
Electric Products Co., 1728 Clarkstone Rd., Cleveland, O. .. ..
Electric Specialty Co., 221 South Stamford, Conn. M F S U
Electro Dynamic Co., Bayonne, N. J. M .. S ..
Emerson Electric Mfg. Co., 2013 Washington Ave., St. Louis, Mo. M F S U
Esco. See Electric Specialty Co.
Fairbanks-Morse & Co., 900 S. Wabash Ave., Chicago, Ill. M F .. ..
Fidelity Elec. Co., Lancaster, Pa. M F S ..
Fitzgerald Mfg. Co., Torrington, Conn. .. F .. ..
Fynn Weichsel. See Wagner Elec. Corp.
Galvin Elec. Mfg. Co., 3314 S. Broadway, St. Louis, Mo. F .. S ..
General Electric Co., Schenectady, N. Y. M F G ..
Gilbert Co., A. C., New Haven, Conn. .. F .. U
Hamilton Beach Mfg. Co., Racine, Wis. .. F S U
Hobart Bros. Co., Troy, O. M .. S ..
Holtzer-Cabot Elec. Co., 125 Amery, Boston... M F .. ..
Howell Elec. Motors Co., Howell, Mich. M F S ..
Ideal Elec. & Mfg. Co., Mansfield, O. M .. S ..
Imperial Electric Co., Akron, O. M .. S ..
Janette Mfg. Co., 551 W. Monroe, Chicago .. F S ..
Jantz & Leist Elec. Co., Cincinnati, O. M F .. ..
Kendrick & Davis Co., Lebanon. N. H. .. F S ..
Kimble Elec. Co., 634 N. Western Ave., Chicago M .. S U
Knapp Elec., Inc., Portchester, N. Y. .. F S U
Leland Elec. Co., Dayton, O. .. F S ..
L. E. See Leland Elec. Co.
Lincoln Elec. Co., Cleveland, Ohio. M .. S ..
Line-Weld. See Lincoln Elec. Co.
Linzee Elec. Motor Co., Mansfield, O. M .. .. ..
Mando Co., 911 State Tower Bldg., Syracuse, N. Y. (6-12-40 Volt only) .. F .. ..
Marathon Elec. Mfg. Co., 32 Island, Wausau, Wis. .. F .. ..
Marble-Card Elec. Co., Gladstone, Mich. M .. .. ..
Master Electric Co., Dayton, O. M F S ..
MC. See General Electric Co.
Michigan Elec. & Mfg. Co., Lake Linden, Mich. .. F S ..
Norfolk. See Walter Elec. Mfg. Co.
North East Appliance Corp., Rochester, N. Y. .. F .. U
Northwestern Mfg. Co., 480 Clinton, Milwaukee M .. .. ..
Ohio Elec. Mfg. Co., 5905 Maurice Ave., Cleveland, Ohio .. F S ..
O. K. See Marathon Elec. Mfg. Co.
Osann Co., F., 245 Seventh Ave., New York M .. .. ..
Peerless Elec. Co., 740 W. Market St., Warren, O. M F S U
Polar Cub. See Gilbert Co., A. C.
Pow-R-Full. See Wagner Elec. Corp.
Reco. See Reynolds Electric Co.
Red Band. See Howell Elec. Motors Co.

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Reliance Elec. & Engrg. Co., 1042 Ivanhoe Bd., Cleveland, O. M .. S ..
Reynolds Electric Co., 2650 W. Congress, Chicago .. F S ..
Robbins & Myers, Inc., Springfield, O. M F S U
Roth Bros. & Co., Div. of Century Elec. Co., 1400 W. Adams, Chicago, Ill. M F S ..
Standard. See Robbins & Myers Co.
Star Elec. Motor Co., Miller St. & N. J. R. R. Ave., Newark, N. J. M .. S ..
Sterling Elec. Motors, Inc., Telegraph Rd. and Atlantic Blvd., Los Angeles, Cal. M .. S ..
Stow Mfg. Co., Binghamton, N. Y. M F S U
Sturtevant Co., 15 Devonshire (Hyde Park), Boston, Mass. M F S U
Sunlight Electrical Mfg. Co., Warren, O. .. F S ..
Super Wick. See Master Elec. Co.
Switch start. See Lincoln Elec. Co.
Troy Engine & Machine Co., Engberg's Div., St. Joseph, Mich. M .. S ..
Union Elec. Motor Mfg. Co., Hancock & Oxford Sts., Philadelphia, Pa. M F S ..
U. S. Elec. Mfg. Co., 200 E. Slawson Ave., Los Angeles M .. S ..
Valley Elec. Co., 4221 Forest Park Blvd., St. Louis, Mo. M .. S ..
Wagner Elec. Corp., 1935 Indiana Ave., St. Louis, Mo. M F S U
Walter Elec. Mfg. Co., Norfolk, Va. M .. S ..
Watson. See Allis Co., Louis.
Welco Uniframe. See Wesche Elec. Co., B. A.
Wesche Elec. Co., B. A., 1622 Vine, Cincinnati M F S ..
Westinghouse Elec. Mfg. Co., East Pittsburgh M F S ..
Woods Mach. Co., S. A., Boston. M F S ..
Zobell Elec. Motor Co., Garwood, N. J. M .. S ..

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See also Decalcomania.
American Name Plate Co., 117 Imlay, Brooklyn, N. Y.
Angell Embossing Co., 37 Barney-Smith Co., Dayton, O.
Chandler Co., Springfield, Mass.
Continental-Diamond Fibre Co., Bridgeport, Pa.
Crowe Name Plate & Mfg. Co., 1749 Grace, Chicago, Ill.
Electro-Chemical Engraving Co., 52 Vanderbilt Ave., New York, N. Y.
Etched Products Corp., 90 Tenth, Long Island City, N. Y.
Etching Co. of America, 1520 Montana, Chicago, Ill.
General Etching & Mfg. Co., 3070 W. Grand Ave., Chicago, Ill.
Graemes & Sons Inc., L. F., Allentown, Pa.
Mayer & Co., Geo. J., 36 S. Meridian, Indianapolis, Ind.
Mechanical Engraving Co., 130 Orchard, Newark, N. J.
Premier Metal Etching Co., 14th & Van Alst Ave., Long Island City, N. J.
Turner Brass Works, Sycamore, Ill.

NICKEL
American Mond Nickel Co., Century Bldg., Pittsburgh, Pa.
Driver-Harris Co., Harrison, N. J.
International Nickel Co., 67 Wall, New York, N. Y.
National-Harris Wire Co., 195 Verona Ave., Newark, N. J.
Seymour Mfg. Co., Seymour, Conn.

NICKEL WIRE CLOTH. See Cloth, Wire.

NOTCHING MACHINES, Armature
Ferracute Machine Co., Bridgeton, N. J.
Niagara Machine & Tool Wks., 637 Northland Ave., Buffalo, N. Y.

NUT SETTING MACHINES
Vim Electric Tool Co., 149 Broadway, New York, N. Y.
OHMMETERS. See Instruments, Laboratory Standard; also Instruments, Portable and Switchboard.
OIL-LESS BEARINGS. See Bearings, Oil-less.
OSCILLOSCOPES. See Instruments, Laboratory Standard.

OVENS, Industrial and Laboratory
Annealing, Tempering, Drawing, Mold Baking, Vulcanizing, Drying, Conditioning, Enameling, Japanning, Vacuum Impregnating.
Argco Laboratories, Inc., 150 W. 22nd, New York, N. Y.
Buffalo Fdry. & Machine Co., 1543 Fillmore, Buffalo, N. Y. (Armature and Coil.)
Conran, Frederick M., 107 Colden, Newark, N. J.
Crawford Oven Co., New Haven, Conn. (Coil Driers.)
Despatch Oven Co., 622 Ninth, S. E., Minneapolis, Minn.
Detroit Sheet Metal Wks., 1341 E. Milwaukee Ave., Detroit, Mich.
Devine Mfg. Co., J. P., Mount Vernon, Ill.
Eberbach & Son Co., Ann Arbor, Mich. (Drying.)
Emerson Apparatus Co., Melrose, Mass. (Conditioning.)
Freas Thermo Elec. Co., 1206 Grove, Irvington, N. J.
Gehnrich Indirect Heat Oven Co., Long Island City, N. Y.
General Electric Co., Schenectady, N. Y.
Hayes, C. I., 129 Baker, Providence, R. I.
Heidbrink Co., 2633 Fourth Ave., S., Minneapolis, Minn.
Hynes & Cox Elec. Corp., 406 N. Pearl, Albany, N. Y.
Kenworthy, Chas. F., 198 Piedmont, Waterbury, Conn.
Lydon Bros., 229 Colden, Jersey City, N. J.
Machler Co., Paul, 2220 West Lake, Chicago, Ill.
Mihc., 717 Sycamore, Cincinnati, O.
Sargent & Co., E. H., 155 E. Superior, Chicago, Ill.
Sioux Battery & Mfg. Co., Sioux City, Ia. (Battery.)
Standard Elec. Stove Co., Toledo, Ohio.
Steiner & Co., E. E. 197 E. Kinney St., Newark, N. J.
Stokes Machine Co., F. J., Tabor Rd. (Olney), Philadelphia.
Swartwout Co., 18522 Euclid Ave., Cleveland, O.
Thelco. See Freas Thermo Elec. Co.
Westinghouse Elec. & Mfg. Co., Mansfield, O.
Young Bros. Co., 6523 Mack Ave., Detroit, Mich.

OXIDES, Battery. See Chemicals, Battery.

PACKING
Cooke Seal Ring, Dept. Y, 46 N. Green St., Chicago, Ill.
Federal Metallic Packing Co., Wakefield, Mass.
Holed-Tite Packing, Inc., 100 E. 42nd, New York, N. Y.

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Packtite. See Federal Metallic Packing Co.

PAINT, Varnish, Lacquer KEY
Varnishes, Insulating .....See V
Painting, Dipping, Spraying, Vacuum Impregnating.
Paint, Insulating and Acid Proof..See P
Lacquer, Metal Finishing .....See L

Aeme White Lead & Color Wks., 8250 St. Aubin Ave., Detroit, Mich. L
Ajax. See Sherwin-Williams Co.
Alaka. See Lacquer & Chemical Corp.
American Di-Electrics, Ltd., Hancock and Bodine, Long Island City, N. Y. V .. ..
American Lastite Co., 3166 Lincoln Ave., Chicago.. .. P L
American Wurtzilite Co., Builders Bldg., Chicago .. P ..
Antakwa Co., 1329 Mohawk, Chicago, Ill. .. P ..
Arizona Lacquer Mfg. Co., 7 16th, Brooklyn, N. Y. L
Armitage Co., John L., 245 Thomas, Newark, N. J. V .. ..
Armlac. See Robertson Chemical Co.
Arolac. See Arizona Lacquer Mfg. Co.
Art-Craft. See Southwestern Paint & Varnish Co.
Atlantic Chemical Co., Cott, Irvington, N. J. L
Atom Chemical Co., 96 E. 10th, New York, N. Y. L
Ault & Wiborg Varnish Wks., 432 New, Cincinnati, O. V .. ..
Bakelite Corp., 247 Park Ave., New York, N. Y. L
Benolite Varnish Co., 501 Columbia Bank Bldg., Pittsburgh V P ..
Berry Bros., Leib & Wight, Detroit, Mich. V .. ..
Billings-Chapin Co., 1163 E. 40th, Cleveland, O. V .. ..
Biwax Corp., 1017 S. Kolmar Ave., Chicago, Ill. .. P ..
Bradley-Hurts Co., 2620 S. Dearborn, Chicago, Ill. L
Bradshaw-Praeger & Co., 3248 W. 47th Pl., Chicago, Ill. V .. ..
Brevolite Lacquer Co., North, Chicago, Ill. L
Calman & Co., Emil, 42 Vernon Blvd., Long Island City, N. Y. V P ..
Carboloid Products Corp., 98 Front, Brooklyn, N. Y. V P ..
Chadeloid Chemical Co., 75 E 45th, New York. V .. ..
Chinalac. See Dolph Co., John C.
Cochrane Chemical Co., 432 Danforth Ave., Jersey City, N. J. V P ..
Code 25. See Mitchell-Rand Mfg. Co.
Columbus Varnish Co., 264 Cozzeins, Columbus, O. V .. ..
Comulac. See Martindale Elec. Co.
Continental-Diamond Fibre Co., Bridgeport, Pa. V .. ..
Doe & Co., Walter S., Kent, Ohio. .. .. ..
Dolph Co., John C., 168 Emmet, Newark, N. J.. V P ..
Duco. See Du Pont de Nemours & Co.
Du Pont de Nemours & Co., Wilmington, Del.. .. P ..
Dures. See General Plastics.
Eastman Kodak Co., Rochester, N. Y. L
Eclipse Paint & Mfg. Co., Cleveland, O. .. P ..
E. B. See Mitchell-Rand Mfg. Co.
Egyptian Lacquer Mfg. Co., 90 West, New York.. L
Electric Lacquer. See Dolph Co., John C.
Enamelac. See Robertson Chemical Co.
Ever-Brite Products Co., East Liverpool, O. L
Ferbert-Schorndorfer Co., 12815 Elmwood Ave., Cleveland, O. V P L
Fesco. See Ferbert-Schorndorfer Co.
Five Point. See American Wurtzilite Co.
Franche & Co., 440 Orleans, Chicago, Ill. L
General Elec. Co., Dept. M-327, Bridgeport, Conn. V P ..
General Plastics, Inc., 49 E. Walck Rd., N. Tonawanda, N. Y. V .. ..
George Co., P. D., 4153 Bingham Ave., St. Louis. V .. ..
G. E. See General Elec. Co.
Glidden Co., Cleveland, O. V P L
Glyptal. See General Electric Co., Schenectady.
H. B. See Mass & Waldstein.
Hilo Varnish Corp., Marcy & Flushing Aves., Brooklyn, N. Y. V P L
Impervious Varnish Corp., 421 Wood, Pittsburgh. V P ..
Insulacrete. See Ohmlac Paint & Refining Co.
Insulvar. See Varflex Corp.
Irvington Varnish & Insulator Co., Irvington, N. J. V P L
Kodalak. See Eastman Kodak Co.
Krakles. See Brevolite Lacquer Co.
Lackerite. See Twin City Shellac Co., Inc.
Lacquer & Chemical Corp., 214-40th St., Brooklyn, N. Y. .. P L
Laqueroid. See Glidden Co.
Liberty. See Antakwa Co.
Linolac. See Mica Insulator Co.
Lowe Bros. Co., 450 E. 3rd, Dayton, O. V P ..
Lucas & Co., John, 322 Race, Philadelphia, Pa.. V P ..
Lucote. See Lucas & Co., John.
Maas & Waldstein, 438 Riverside Ave., Newark, N. J. L
Martindale Elec. Co., 1262 W. Fourth, Cleveland, O. V .. ..
Mawalac. See Maas & Waldstein.
Mecco. See Henry V. Walker Co.
Mica Insulator Co., 200 Varick St., New York.... V .. ..
M. I. C. See Mica Insulator Co.
Mitchell-Rand Mfg. Co., 19 Vesey, New York, N. Y. V P ..
Nepto Lac. See Lowe Bros. Co.
Nikolas & Co., G. J., 1227 W. Van Buren, Chicago. L
O'Brien Varnish Co., South Bend, Ind. V P L

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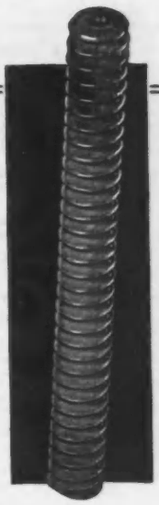

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Peninsular Paint & Varnish Co., Detroit, Mich. L
Peerless. See Maas & Waldstein.
Prismiac. See Maas & Waldstein.
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Sipe & Co., James B., Chamber of Commerce Bldg., Pittsburgh, Pa. L
Southwestern Paint & Varnish Co., 610 Broadway, Kansas City, Mo . . . . . V P . .
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Standard Lacquer Co., 621 Broadway, New York. L
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Voltax Co., 99 Reservoir Ave., Bridgeport, Conn. V P . .
Walpole. See Robertson Chemical Co.
Walker Co., Henry V., 17 John St., New York. L
Westinghouse Elec. & Mfg. Co., E. Pittsburgh, Pa. V P . .
Zapon Co., Stamford, Conn. L
Zollac. See Zeller Lacquer Mfg. Co.
Zeller Lacquer Mfg. Co., 30 E. 49th, New York. L

PANELS (panel) Engraving. See Engraving.
Radio (Metal). See Radio Mountings.
Radio (Molded). See Radio Molded Parts.
Radio (Hard Rubber) See Rubber Hard.
Meters. See Instruments, Portable & Switchboard.

PAPER
Boxes. See Boxes & Wrappers.
Bushings. See Tubes, Paper.
Candles. See Candles, Fixture.
Cores. See Tubes, Paper.
Fibre. See Cloth and Paper.
Fish. See Cloth & Paper.
Insulating. See Cloth and Paper.
Parchment. See Parchment Paper.
Shades. See Shades, Fabric.
Sleeves. See Tubes, Paper.

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Little Speedster. See Gilbert Supply Co.
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Asam Wright. See Asam Bros.
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Hamilton Engrs. Products Co., Hamilton, Ohio (Music Rolls).

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Electric B-G Products Co., Ithaca, Mich.
Foto Cell. See National Carbon Co.
General Electric Co., Schenectady, N. Y.
G-M Laboratories, Inc., Grace & Ravenswood Ave., Chicago.
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McWilliams. See Electric B-G Products Co.
National Carbon Co., New York, N. Y.
Photion Instrument Corp., 574 Southern Blvd., New York.
Visitron. See G-M Laboratories, Inc.
Westinghouse Elec. & Mfg. Co., Mansfield, Ohio.

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Metals Protection Corp., 401 Michigan, Indianapolis, Ind.
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Rochester Elec. Products Corp., 89 Allen, Rochester, N. Y.
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Reynolite Masterpiece. See Reynolds Spring Co.
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Spark-O-Metal. See Hardy Metal Corp.
Tungsten Electric Corp., 545 39th, Union City, N. J.
Wilco. See Wilson Co., H. A.
Wilson Co., H. A., Newark, N. J. (Platinum and Silver.)

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POLISHING MACHINES, WIRE. See Wire Polishing Machines.

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Bushings. See Bushings, Box & Cabinet.
Cement. See Cement, Liquid, Porcelain.
Insulators. See Porcelain.
Liquid. See Cement, Liquid Porcelain.
Molding Machine. See Presses, Porcelain Molding.
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Tubes. See Porcelain.

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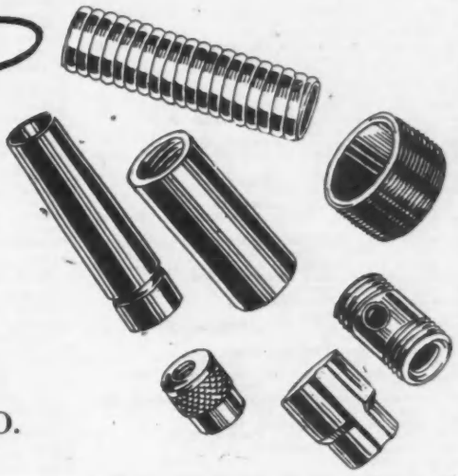

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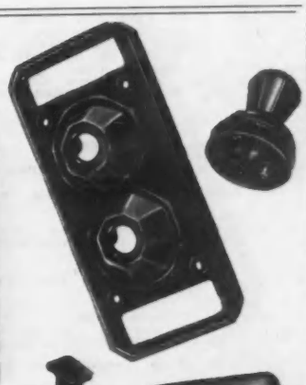

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Circle F Mfg. Co., Trenton, N. J.
Colonial Insulator Co., Akron, O.
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Cook Pottery Co., Trenton, N. J.
Corns China Co., Wellsville, O.
Crowley & Co., 1 Centry Ave., West Orange, N. J.
Crowlite. See Crowley & Co.
Electrical Refractories Co., East Palestine, O.
Globe Porcelain Co., Mulberry St. and St. Joes Ave., Trenton, N. J.
Hartford Faience Co., Hartford, Conn.
Hub-Way Mfg. Co., Hubbard, Ohio.
Illinois Electric Porcelain Co., Macomb, Ill.
Imperial Porcelain Wks., Canal and Mulberry, Trenton, N. J.
Knox Porcelain Corp., Knoxville, Tenn.
Louthan Mfg. Co., East Liverpool, O.
Mercer Porcelain Co., Trenton, N. J.
Metsch Refractories Co., East Liverpool, Ohio.
National Porcelain Co., Trenton, N. J.
New Jersey Porcelain Co., Trenton, N. J.
Nu Blue. See Star Porcelain Co.
Pass & Seymour, Inc., Solvay Sta., Syracuse, N. Y.
Porcelava. See Burgess & Co.
Porcelain Products, Inc., Findlay, Ohio.
Square D Company, Detroit, Mich.
Standard & Specialty Porcelain Co., Sun Prairie, Wis
Star Porcelain Co., Muirhead St., Trenton, N. J.
Stupakoff Laboratories, 6627 Hamilton Ave., Pittsburgh, Pa.
Thomas & Sons Co., R., Lisbon, O.
Trenle Porcelain Co., East Liverpool, Ohio.
Union Elec'l Porcelain Wks., Inc., Trenton, N. J.
Washington Porcelain Co., Washington, N. J.

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Unglazed earthenware cups for primary (wet) batteries
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Maddocks Sons, John, Trenton, N. J.
Ohio Pottery Co., Zanesville, Ohio.
Robinson Clay Products Co., Akron, Ohio.

POSTS, Binding
Binding Posts, Switch Parts, Stop Points, Contacts, Arms, Levers. See also Radio Mountings.
American Radio Hardware Co., 135 Grand, New York.
Bunnell & Co., J. H., 32 Park Pl., New York, N. Y.
Chapman Machine Co., Terryville, Conn.
Chase Brass & Copper Co., Waterbury, Conn.
Eby Mfg. Co., Inc., H. H., 4710 Stenton Ave., Philadelphia, Pa.
Ensign. See Eby Mfg. Co., H. H.
Eureka. See Frank W. Morse Co.
Grammes & Sons, Inc., L. F., Allentown, Pa.
Gray Bros., Plano, Ill.
Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn.
Hoosick Falls Radio & Electrical Parts Mfg. Co., Hoosick Falls, N. Y.
King. See Morse Co., Frank W.
Morse Co., Frank W., 285 Congress, Boston. (Spring Grip.)
Nutmeg. See Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co.
Polk, J. L., 41 Bell Ave., Troy, N. Y.
Premier Elec. Co., 3800 Ravenswood Ave., Chicago, Ill.
Quality. See H. H. Eby Mfg. Co.
Queen. See Morse Co., Frank W.
Thomaston Mfg. Co., Thomaston, Conn.
Waterbury Button & Moulding Co., Waterbury, Conn.
POTENTIOMETERS (Instruments). See Instruments, Laboratory Standard.
POTENTIOMETERS (Radio Control). See Radio Receiver Parts.
POWDERED CARBON. See Carbon, Powdered.
POWER TRANSMISSION CHAIN. See Chain, Power Transmission
PRESS BOARD. See Cloth and Paper.

PRESSES, Armature Coil
Comstock Mfg. Co., Wilkes-Barre, Pa.
PRESSES, ARMATURE NOTCHING. See Notching Machines, Armature.

PRESSES, Molded Insulation
Burroughs Co., 246 N Tenth, Newark, N. J.
Busch-Sulzer Bros. Diesel Engine Co., Second & Utah Sts., St. Louis, Mo.
Dunning & Boschert Press Co., 329 W. Water, Syracuse.
Duo-Press. See Busch-Sulzer Bros.
Elmes Engrg. Works, Chas. F., 230 N. Morgan, Chicago.
Evans Engrg. Works, Chas. E., 1002 Fulton, Chicago, Ill
Farquhar Co., A. B., York, Pa.
French Oil Mill Machinery Co., Piqua, O.
Southwark Fdy. & Mach. Co., 400 Washington Ave., Philadelphia, Pa.
Stokes Mach. Co., F. J., Tabor Rd. (Olney), Philadelphia.
Terkelsen Machine Co., Terkelsen Bldg., Boston, Mass.
Watson-Stillman Co., 75 West St., New York, N. Y
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PRESSES, Porcelain Molding
Baird, Andrew, 2715 Newark, Detroit, Mich

PRESSES, Punching and Bending
Bench Presses—Power Presses; for Punching & Stamping Sheet Metal.
American Can Co., 230 Park Ave., New York, N. Y.
Ams Machine Co., Max, 101 Park Ave., New York, N. Y
Baird Machine Co., Bridgeport, Conn.
Bliss Co., E. W., 53rd St. & Second Ave., Brooklyn, N. Y
Camco. See American Can Co.
Federal Press Co. Elkhart, Ind.
Ferracute Machine Co., Bridgeton, N. J.
Hyre Mfg. Co., 200 Varick, New York, N. Y.
Loshbough-Jordan Tool & Machine Co., Elkhart, Ind.
Niagara Machine & Tool Wks., 637 Northland, Buffalo.
Peck, Stow & Wilcox Co., Southington, Conn.
Rockford Iron Works, 846 Ray, Rockford, Ill.
PRESSES, Stamping. See Presses, Punching & Bending.
PRISMS, Chandelier. See Crystals, Chandelier
PROJECTOR LENSES. See Lenses.

PULLERS, Armature Shaft
Motor Pulley, Shaft & Pinion Pullers & Extractors.
Allen Electric & Equipment Co., Kalamazoo, Mich.
Big Buster. See Premier Elec. Co.
Crane Puller Co., West Newton, Mass.
Columbia Machine Works & Malleable Iron Co., Atlantic Ave. & Chestnut St., Brooklyn, N. Y.
Duff-Norton Mfg. Co., Pittsburgh, Pa.
Electric Service Supplies Co., 17th & Cambria Sts. Philadelphia, Pa.
Little Giant. See Premier Elec. Co.
Peerless. See Electric Service Supplies Co.
Premier Electric Co., 3800 Ravenswood Ave., Chicago, Ill.
Weidenhoff, Joseph, 4352 Roosevelt Rd., Chicago, Ill.

PULLEYS, Composition
General Electric Co., Schenectady, N. Y.
Rockwood Mfg. Co., Indianapolis, Ind.
Sprucolite Co., Bloomfield, N. J.

PUMPS, Oil Burner
Janette Mfg. Co., 556 W. Monroe, Chicago, Ill.
Milwaukee Tank Wks., Milwaukee, Wis.
Monroe Machine Tool Co., 737 W. Jackson Blvd., Chicago.
Reflex. See Simplex Oil Heating Co.
Simplex Oil Heating Co., 1199 Eddy, Providence, R. I.
Teesdale Mfg. Co., 427 Market, Grand Rapids, Mich.

PUMPS, Vacuum
To Exhaust Incandescent Lamps.
Beach-Russ Co., 50 Church, New York, N. Y.
Bishop & Babcock Sales Co., 4901 Hamilton Ave., N. E., Cleveland, O.
Cenco. See Central Scientific Co.
Central Scientific Co., 460 E. Ohio, Chicago, Ill.
Dunham Co., C. A., 450 East Ohio, Chicago, Ill.
Eimer & Amend, 205 3rd Ave., New York, N. Y.
Eisler Elec. Corp., 756 S. 13th, Newark, N. J.
General Electric Co., Schenectady, N. Y.
Hubbard's Sons, Norman, 1 Carlton Ave., Brooklyn, N. Y.
Megavac. See Central Scientific Co.
Packard. See Hubbard's Sons, Norman.
PUNCHING PRESSES. See Presses, Punching.

PUNCHING and BENDING, Sheet Steel
Anderson Mfg. Co., Albert & J. M., 289 A, Boston, Mass.

RACKS, Wire Reel
(With Tension Device Attached).
Armature Coil Equipment Co., 2415 Forestdale Ave., Cleveland, Ohio.
Browning See Mutual Foundry & Machine Co.
Chapman Elec'l Wks., P. E., 1829 Chouteau Ave., St. Louis, Mo. (Tensionless Dereeler.)
Columbia Machine Tool Works & Malleable Iron Co., Atlantic Ave. and Chestnut St., Brooklyn, N. Y.
Comstock Mfg. Co., Wilkes-Barre, Pa.
Electric Service Supplies Co., 17th & Cambria Sts., Philadelphia, Pa.
General Elec. Co., Schenectady, N. Y. (Tension Indicator.)
Mutual Foundry & Machine Co., Atlanta, Georgia.
Segur. See Electric Service Supplies Co.

RADIO CIRCUIT COMPONENTS
This heading includes Inductances (Coils), Capacitors (Condensers), Fixed Resistances, Grid Leaks, Transformers, Choke Coils, and Filters, also Amplifier Units and Kits.
Acme Apparat. Corp., 39 Osborne, Cambridge, Mass.
Acme Products Co., Boston, Mass.
Acme Wire Co., New Haven, Conn.
Aero-Call. See Aero Products, Inc.
Aerovox Wireless Corp., 80 Washington, Brooklyn, N. Y.
Aero Products, Inc., 4611 Ravenswood Ave., Chicago, Ill.
Air-King Products Co., 216 Wallabout, Brooklyn, N. Y.
Ajax Elec. Specialty Co., St. Louis, Mo.
Akra-Ohm. See Shallcross Mfg. Co.
Alden Mfg. Co., Springfield, Mass.
Allen-Bradley Co., 494 Reed, Milwaukee, Wis.
Amerchoke. See American Transformer Co.
American Apparatus Co., Richmond, Ind.
American Transformer Co., Newark, N. J
Amperite Rheostat. See Radiall Co.
Amrad Corp., Medford, Hillside, Mass. (Electrolytic Condensers.)
Arco Elec'l Corp., 211 E. Columbia, Fort Wayne, Ind.
Arctic. See Premier Elec. Co.
Art Dial. See Pilot Radio & Tube Corp.
Audioformer Transformer. See Pacent Electric Co.
Autoformer. See Thordarson Elec. Mfg. Co.
Automatic Oil Heat Co., 2234 E. Fourth, St. Paul, Minn.
Automotive Parts Mfg. Co., 70 Washington St., Brooklyn.
B-Conomizer. See Pilot Radio & Tube Corp.
Benjamin Elec. Mfg. Co., Des Plaines, Ill.
Bonine. See Turn-it Radio Sales.
Branston Co., Chas. A., 297 Washington, Buffalo, N. Y.
Brooklyn Metal Stamping Corp., 718 Atlantic Ave., Brooklyn, N. Y.
Browning-Drake Corp., Calvary, Waltham, Mass.
Buffer. See Aerovox Wireless Corp.
Buffalo. See De Jur-Amsco Corp.
Camfield. See Columbia Metal Products Co.
Campbell Electric Mfg. Co., 15 Stewart, Lynn, Mass.
Capacigrad. See Pilot Radio & Tube Corp.
Cardwell Mfg. Corp., Allen D., 81 Prospect, Brooklyn, N. Y.
Carter Mfg. Co., 6300 Euclid Blvd., East Cleveland, O.
Carter Radio Co., 407 S. Aberdeen, Chicago, Ill.
Central Radio Corp., Beloit, Wis.
Centraline. See Pilot Radio & Tube Corp.
Certified Condenser. See Radio Condenser Co.
Chelten Elec. Co., 4850 Stenton Ave., Philadelphia, Pa.
Clarostat Mfg. Co., 281 N. Sixth, Brooklyn, N. Y. (Radio Resistance.)
Cleveland Steel Products Corp., 7306 Madison Ave., Cleveland, O.
Cole Radio Mfg. Corp., 536 Bloomfield Ave., Bloomfield, N. J.
Columbia Metal Products Co., 360 E. Grand Ave., Chicago.
Concertone. See Chicago-Jefferson Fuse.
Connectoralds. See Alden Mfg. Co.
Continental Carbon, Inc., Cleveland, O.
Continental. See Gardiner & Hepburn, Inc.
Cornell Elec. & Mfg. Co., Anable & Rawson, Long Island City, N. Y.
Crescadio Corp., 166-32 Jamaica Ave., Jamaica, N. Y.
Crofot. See Premier Elec. Co.
Cub. See Cornell Electric & Mfg. Co.
Daven Co., 158 Summit, Newark, N. J. (Kits)
Davohm. See Daven Co.
DeForest Radio Co., Passaic, N. J.
De Jur-Amsco Corp., 418 Broome, New York, N. Y.
Diamond Weave Coil. See Sickles Co., F. W.
Dongan Elec. Mfg. Co., 2985 Franklin, Detroit, Mich.
Dubilier Condenser Corp., 342 Madison av., New York
Dumont Elec. Co., 40 W. 17th, New York, N. Y.
Duratran. See Dubilier Condenser Corp.
Durham & Co., 1936 Market, Philadelphia, Pa.
Dynohmic. See Lynch, Inc.
Eagle Elec. Mfg. Co., 79 Hall, Brooklyn, N. Y.
Electrad, Inc., 173 Varick, New York, N. Y.

Rheostats.
1. Air Heaters
2. Automatic Motor Starters.
3. D. C. Battery Charging Equipment.
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5. Laboratory Resistors and
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Electrical Research Laboratories, 2500 Cottage Grove Ave., Chicago, Ill.
Electro Motive Engineering Corp., 127 W. 17th, New York.
Elkay. See Langbein Kaufman Radio Co.
Elkon, Inc., 350 Madison Ave., New York, N. Y.
El Menco. See Electro Motive Engineering Co.
Equamatic Kit. See Karas Elec. Co.
Equitrol. See Cardwell Mfg. Corp.
E-Z. See Polymet Mfg. Corp.
Faradon. See Wireless Specialty Apparatus Co.
Fast Co., John E., 3982 Barry Ave., Chicago, Ill.
Ferranti, Inc., 130 W. 42nd, New York, N. Y.
Filatrol. See De Jur-Amsco Corp.
Filterettes. See Tobe Deutschmann Co.
Fleshheim Co., A. M., 136 Liberty, New York, N. Y.
Ford Radio & Mica Corp., 113 Bleecker, New York, N. Y.
Frost, Inc., Herbert H., 1142 W. Beardsley, Elkhart, Ind.
Furnell Die Cast Condenser Corp., 16 Hudson, New York.
F. & H. Radio Laboratories, Fargo, N. D.
Gardiner & Hepburn, Inc., 611 Widener Bldg., Philadelphia, Pa.
General Instrument Corp., 225 Varick, New York, N. Y.
General Mfg. Co., 8066 S. Chicago Ave., Chicago, Ill. (Coils.)
General Radio Co., 30 State, Cambridge, Mass
General Transformer Corp., 910 W. Jackson Blvd., Chicago.
General Winding Co., 214 Fulton, New York, N. Y.
Gen-Win. See General Winding Co.
Ger-Ait Radio Laboratories, 859 Flatbush Ave., Brooklyn, N. Y. (Adapter.)
Glastor. See Daven Co.
Globar Corp., Niagara Falls, N. Y.
Glo-Dial. See Wireless Radio Corp.
Gray & Danielson Mfg. Co., 2101 Bryant, San Francisco, Cal.
Halldorsen Co., 4745 N. Western Ave., Chicago, Ill.
Hammarlund Mfg. Co., 424 W. 33rd, New York, N. Y.
Hardwick, Hindle, Inc., 215 Emmett, Newark, N. J.
Harmonik. See Karas Elec. Co.
Hedgehog Transformer. See Premier Elec. Co
Heinemann Elec. Co., Trenton, N. J.
Held-Tite, Hi-ohm, Hi-pot. See Carter Radio Co.
Hi-Q Kit. See Hammarlund.
Hum-Dinger. See Clarostat Mfg. Co.
Hy-Wat. See Electro Motive Engineering Corp.
Igrad Condenser & Mfg. Co., 4322 Lake Ave., Rochester, N. Y.
Infra-Dyne. See Gray & Danielson Co.
International Resistance Co., 2006 Chestnut, Philadelphia, Pa.
Isograd, Isoleak. See Pilot Radio & Tube Corp.
Jefferson Electric Co., 1500 S. Laflin, Chicago, Ill.
J-M-P. Mfg. Co., 3320 Fond du Lac Ave., Milwaukee, Wis.
Karas Elec. Co., 4040 N. Rockwell, Chicago, Ill
Kenyon Transformer Co., 132 Cypress Ave., New York, N. Y.
Kilograd. See Pilot Radio & Tube Corp.
Kroblack. See Mountford, C. E.
Kuprox. See Kodel Radio Corp.
Langbein-Kaufman Radio Co., 62 Franklin, New Haven, Conn.
Lavite. See Aerovox Wireless Corp.
Lautz Mfg. Co., 245 N. J. R. R. Ave., Newark, N. J. (Radio Resistance).
Leakandenser. See Daven Co.
Lekeless. See Benjamin Elec. Mfg. Co.
Lemnis. See General Winding Co.
L. M. C. See Lautz Mfg. Co.
Loftin-White. See Hammarlund Mfg. Co.
Loless. See Wireless Radio Corp.
Lynch, Arthur H., 1775 Broadway, New York, N. Y.
Marco. See Martin-Copeland Co.
Martin-Copeland Co., 101 Sabin, Providence, R. I.
Maxitran. See Electrical Research Laboratories.
Mayo Laboratories, Inc., 281 E. 137th, New York, N. Y.
Mayolian Corp., 1566 Webster Ave., New York, N. Y (Tone Filter.)
Meggit. See Cole Mfg. Corp.
Melcoupler. See Robertson-Davis Co.
Meloformer. See Robertson-Davis Co.
Mershon. See Amrad Corp.
Metaleak. See Dubilier Condenser Corp.
Metrolign. See General Instrument Corp.
Micadon Condenser. See Dubilier Condenser Corp.
Micamold Radio Corp., 1087 Flushing Ave., Brooklyn, N. Y. (Amplifier Kit.)
Mica-Static. See Dubilier Condenser Corp.
Micon Condenser. See Dubilier Condenser Corp.
Microcondenser. See Sterling Mfg. Co.
Micrograd. See Pilot Radio & Tube Corp.
Micrometric. See Karas Elec. Co.
Microstat. See Premier Elec. Co.
Midline. See Hammarlund Mfg. Co.
Mountford, C. E., 30 Sullivan, New York, N. Y.
Muter Co., Leslie F., 3440 S. Chicago Ave., Chicago, Ill. (Amplifier Kits.)
National Co., 61 Sherman St., Malden, Mass.
Neutro-Grad. See Pilot Radio & Tube Corp.
New York Coil Co., Mount Clare, Pa.
Nutmeg. See Hart & Hegeman Mfg. Co.
Ohio Carbon Co., 8215 Almira Ave., Cleveland, O.
Ohmite Mfg. Co., 642 N. Albany Ave., Chicago, Ill. (Resistance.)
One Way. See Carter Radio Co.
Orthometric. See Karas Elec. Co.
Orthophone. See De Jur-Amsco Corp.
Pacent Electric Co., 91 7th Ave., New York, N. Y.
Pam. See Samson Elec. Co.
Panatrol See Wireless Radio Corp.
Perry Elec'l Resistor Corp., 280 New Main St., Yonkers N. Y.
Phasatrol. See Electrad, Inc.
Philmore Mfg. Co., 106 7th Ave., New York, N. Y.
Pierce Airo. See United Scientific Laboratories.
Pierce Mfg. Co., 625 W. Jackson Blvd., Chicago, Ill.
Pilot Radio & Tube Corp., 323 Berry, Brooklyn, N. Y.
Pilotran. See Pilot Radio & Tube Corp.
Potter Mfg. Co., North Chicago, Ill. (Electro-Chemical Condensers.)
Polymet Mfg. Corp., 829 E. 134th St., New York, N. Y

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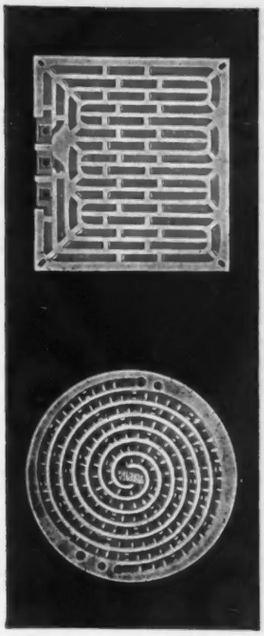

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Powerohm. See International Resistance Co.
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Precision Coil Co., 122 Greenwich, New York, N. Y.
Precise Mfg. Corp., 254 Mill, Rochester, N. Y.
Premier Elec. Co., 3800 Ravenswood Ave., Chicago, Ill.
Protectorald. See Alden Mfg. Co.
Pyrohm. See Aerovox Wireless Corp.
Radiall Co., 50 Franklin, New York, N. Y.
Radio Appliance Corp., Springfield, Mass.
Radio Condenser Co., Thorn & Copewood, Camden, N. J.
Radio Engrg. Laboratories, 100 Wilbur Ave., Long Island City, N. Y. (Short Wave Kit.)
Radiolor Switch. See Cutler-Hammer Mfg. Co.
Radio Receptor Co., 106 7th Ave., New York.
Radiostat. See Allen-Bradley Co.
Raola. See Modern Elec. Mfg. Co.
Receptrad. See Radio Receptor Co.
Resonator. See F. & H. Radio Laboratories.
Remler. See Gray & Danielson Co.
Resistaformer. See Aerovox Wireless Corp.
Resistograd. See Pilot Radio & Tube Corp.
Rittenhouse Co., A. E., Honeoye Falls, N. Y. (Sole Selling Agent), Hatheway & Co., 16 Hudson, New York, N. Y.
Roberts Condenser. See Hammarlund Mfg. Co.
Robertson-Davis Co., 412 Orleans, Chicago, Ill.
Samson Elec. Co., Canton, Mass. (TRF Kits)
Sangamo Electric Co., Springfield, Ill. (Transformers & Condensers.)
Scovill Mfg. Co., Waterbury, Conn.
Sensory. See Heinemann Electric Co
Sevision Magneto Engr. Co., 397 Phillips, Toledo, O.
Shallcross Mfg. Co., 700 Parker Ave., Collingdale, Pa.
Sickles Co., F. W., 130 Union, Springfield, Mass.
Signal Elec. Mfg. Co., Menominee, Mich.
Silver-Marshall, Inc., 6401 W. 65th St., Chicago. (Amplifier Kits.)
Silvertone. See Radio Receptor Co.
S. L. S. See Wireless Radio Corp.
S. L. T. See General Instrument Corp.
Somersolo. See DeForest Radio Co.
Splitmeter. See Premier Electric Co.
Sprague Specialties Co., Dept. M., Quincy, Mass.
Standard Transformer Co., Warren, O.
Sta-Put. See Martin-Copeland Co.
Sterling Mfg. Co., 2831 Prospect Ave., Cleveland, O.
Stromberg-Carlson Tel. Mfg. Co., Rochester, N. Y.
Submarinet. See J-M-P Mfg. Co.
Super Multiformer. See Precise Mfg. Corp
Supertran Transformer. See Ford Radio & Mica Co.
Symphony. See Modern Elec. Mfg. Co.
Synerodenser. See Precise Mfg. Corp.
Telemonic Coil. See Condenser Corp. of America.
Telos Coil. See Condenser Corp. of America.
Thomas Engineering & Mfg. Co., 616 S. Michigan Ave., Chicago, Ill. (Condensers.)
Thompson-Levering Co., 351 N. 57th, Philadelphia, Pa.
Thordarson Elec. Mfg. Co., Huron & Kingsbury Sts., Chicago
Tobe Deutschman Co., Canton, Mass.
Tone Control. See Sprague Specialties Co.
Transcript-Clapp Kit. See Samson Electric Co.
Truphonic Amplification. See Alden Mfg. Co.
Tunadapta. See Lynch, Arthur H.
Tuway. See Carter Radio Co.
Twin-aud. See Peerless Radio Co.
Twin-Eight Transformers. See Bodine Electric Co.
Two-Ten & Two-Eleven. See Silver-Marshall.
Ultra Vario. See Bruno Radio Corp.
Universior Condenser. See Auburn Button Works.
Universal Electro Chemical Corp., 30 W. 15th, New York
Universal Winding Co., Boston, Mass.
Valley Appliances, Inc., 634 Lexington Ave., Rochester, N. Y.
Variall Condenser. See Muter Co.
Volta. See Universal Electro Chemical Corp.
Volumgrad. See Pilot Radio & Tube Corp.
Walbert Radio Corp., 1000 Fullerton Ave., Chicago, Ill.
Ward Leonard Electric Co., 31 South, Mount Vernon, N. Y.
Wireless Radio Corp., Varick Ave. & Harrison Pl., Brooklyn, N. Y.
Wireless Specialty Apparatus Co. (J. P.), Boston, Mass.

RADIO HARDWARE. See Radio Mountings.

RADIO MOUNTINGS

Coil Mountings, Coil Sliders and Rods, Switches, Detectors, Detector and Grid Leak Mountings, Panel Brackets, Special Radio Hardware & Trimmings, Metal Dials, Metal Panels, etc.

Aerovox Wireless Corp., 80 Washington, Brooklyn, N. Y.
Alden Mfg. Co., Brockton, Mass.
American Emblem Co., Utica, N. Y.
American Radio Hardware Co., 135 Grand, New York.
Bonza. See Haydon & Haydon.
Carborundum Co., Niagara Falls, N. Y. (Detector.)
Chapman Machine Co., Terryville, Conn.
De Jur-Amsco Corp., 418 Broome, New York, N. Y.
Durham & Co., 1936 Market, Philadelphia, Pa.
Electrad, Inc., 173 Varick, New York, N. Y.
Etched Products Corp., 90 Tenth, Long Island City, N. Y (Metal Panels.)
Eureka. See Morse Co, Frank W.
General Etching & Mfg. Co., 3072 West Grand Ave., Chicago, Ill. (Metal Panels & Escutcheons.)
Globe Technolian Corp., Reading, Mass.
Glodial. See Wireless Radio Corp.
Hart & Hegeman Mfg. Co., Hartford, Conn.
Haydon & Haydon, 167 Chambers, New York, N. Y.
Master Engineering Co., 122 S. Michigan Ave., Chicago, Ill.
Morse Co., Frank W., 291 Congress, Boston, Mass.
Muter Co., Leslie F., 8440 S. Chicago Ave., Chicago
Na-Ald. See Alden Mfg. Co.
Union Insulating Co., 296 Broadway, New York, N. Y.
Waddell Mfg. Co., Grand Rapids, Mich.
Wireless Radio Corp., Varick Ave. & Harrison Pl., Brooklyn.
Yaxley Mfg. Co., 9 S. Clinton, Chicago, Ill.

RADIO PANEL ENGRAVING. See Engraving, Radio Panel.

RADIO RECEIVER PARTS

Rheostats, Sockets, Plugs, Jacks.

Acme Elec. & Mfg. Co., 1652 Rockwell, Cleveland, Ohio.
Alden Mfg. Co., Springfield, Mass.
Allen-Bradley Co., 494 Reed, Milwaukee, Wis.
Amacostat. See American Apparatus Co.
American Apparatus Co., Richmond, Ind.
Automotive Equipment Co., 317 Halsey, Newark, N. J.
B. M. S. See Brooklyn Metal Stamping Corp.
Beaver Mfg. Co., 412 N. Third, Newark, N. J. (Multiple Plugs.)
Benjamin Elec. Mfg. Co., Des Plaines, Ill.
Brach Mfg. Corp., L. S., 120 Sussex Ave., Newark, N. J
Brooklyn Metal Stamping Corp., 718 Atlantic Ave., Brooklyn
Cabelug. See Jones, Howard B
Carter Radio Co., 407 S. Aberdeen, Chicago, Ill. (Also Socket Adapters.)
Central Radio Laboratories, 14 Keefe Ave., Milwaukee.
Centralab. See Central Radio Laboratories
Cinch Mfg. Corp., 2335 W. Van Buren, Chicago, Ill.
Clarostat Mfg. Co., 285 N. Sixth, Brooklyn, N. Y.
Cle-Ra-Tone. See Benjamin Elec. Mfg. Co.
D. A. Radio Co., 80 Hollister, Buffalo, N. Y.
De Jur-Amsco Corp., 418 Broome, New York, N. Y.
De Veau. See Stanley & Patterson.

Dongan Elec. Mfg. Co., 2985 Franklin, Detroit, Mich.
Duostat. See De Jur-Amsco Corp.
Dynofilter Mfg. Co., 1022 E. 178th, New York, N. Y. (Interference Eliminator).
E-Z. See Polymet Mfg. Corp.
Eby Mfg. Co., H. H., 4710 Stenton Ave., Philadelphia, Pa.
Electrad, Inc., 173 Varick, New York, N. Y.
Fantail Plug. See Brooklyn Metal Stamping Corp.
Frost, Herbert H., 1142 W. Beardsley, Elkhart, Ind.
Gem-Jac. See Frost, Herbert H.
General Instrument Corp., 225 Varick, New York, N. Y
General Radio Co., 30 State, Cambridge, Mass.
Gray & Danielson Mfg. Co., 2101 Bryant, San Francisco,
Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn.
Heinemann Elec. Co., Trenton, N. J.
Imp. See Carter Radio Co.
Jones, Howard B., 2300 Wabansia, Chicago. (Multiple Plug)
Martin-Copeland Co., 101 Sabin, Providence, R. I.
Micrograd. See Pilot Radio & Tube Corp.
Modu-Plug. See Central Radio Lab.
Morse Co., Frank W., 291 Congress, Boston, Mass.
Muter Co., Leslie F., 8440 S. Chicago Ave., Chicago.
Nutmeg. See Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co.
Pacent Elec. Co., 91 Seventh Ave., New York, N. Y.
Pan-Tab Jack. See Frost, Herbert H.
Philmore Mfg. Co., 106 Seventh Ave., New York, N. Y
Pilot Radio & Tube Corp., 323 Berry, Brooklyn, N. Y.
Polymet Mfg. Corp., 829 E. 134th St., New York, N. Y.
Premier Elec. Co., 3800 Ravenswood Ave., Chicago, Ill.
Resto Mfg. Co., 23 W. Third, Cincinnati, Ohio
Robertson-Davis Co., 361 W. Superior, Chicago, Ill.
Royalty. See Electrad, Inc.
Samson Elec. Co., Canton, Mass.
Sucostat. See D. A. Radio Co.
Sterling Mfg. Co., 2831 Prospect Ave., Cleveland, Ohio.
Tubestat. See Muter Co.
Wireless Radio Corp., Varick Ave. & Harrison Pl., Brooklyn
Workrite Radio Corp., 1838 E. 30th, Cleveland, O.
Yaxley Mfg. Co., 9 S. Clinton, Chicago, Ill.

RADIO RECTIFIER TUBES

Armstrong Electric Co., 187 Sylvan Ave., Newark, N. J.
Arcturus Radio Tube Co., 260 Sherman Ave., Newark, N. J
Audion. See De Forest Radio Co.
Cable Radio Tube Corp., 80 N. Ninth, Brooklyn, N. Y.
Ceco Mfg. Co., 1200 Eddy, Providence, R. I.
Conneway Elec. Laboratories, 400 Jefferson, Hoboken, N. J.
Cunningham, Inc., E. T., 470 Seventh Ave., New York, N. Y.
Daven Co., 158 Summit, Newark, N. J.
DeForest Radio Co., Passaic, N. J.
Diamond Electric Co., Newark, N. J.
Diamond Vacuum Products Co., 4052 Diversey Ave., Chicago
Eveready Raytheon. See National Carbon Co.
Gold Seal Electrical Co. of Ohio, Inc., 250 Park Ave., New York, N. Y.
Hygrade Lamp Co., Salem, Mass.
Hytron Corp., Salem, Mass.
Jaeger Research Laboratories, 280 Park Ave., Weehawken, N. J.
Ken-Rad Tube & Lamp Corp., Owensboro, Ky.
Manhattan Elecl. Supply Co., 510 Sixth Ave., New York.
National Carbon Co., New York, N. Y.
National Radio Mfg. Co., 1020 S. Central Park Ave., Chicago, Ill.
Neptron. See Hygrade Lamp Co.
Northern Mfg. Co., 367 Ogden, Newark, N. J.
Paramount Mfg. Co., 79 Orange, Newark, N. J.
Pentode. See Ceco Mfg. Co.
Perryman Electric Co., 4501 Hudson Blvd., North Bergen, N. J.
Radio-Victor Corp. of America, 233 Broadway, New York.
Specialty Appliance Co., 6611 Euclid Ave., Cleveland, Ohio.
Sylvania Products Co., Emporium, Pa.
United Radio & Elec. Corp., 500 Chancellor Ave., Irvington, N. J
Van Horne Tube Co., 280 Center, Franklin, Ohio.

RADIO TRANSFORMERS. See Radio Circuit Components

RADIO TUBE BASE BRANDERS. See Engraving Radio Panel.

RADIO TUBE BASES. See Radio Molded Parts.

RADIO TUBE BULBS (Unfinished). See Bulbs, Glass.

RADIO TUBE PARTS

Filament Hooks, Mesh Plates, Special Bolts & Nuts, Stampings, etc.

Goat Radio Tube Parts, Inc., 33 35th, Brooklyn, N. Y. (Screens.)
Juno Fasteners, Inc., Hillside, N. J
Newark Plate Laboratories, 228 Jelliff Ave., Newark, N. J. (Mesh Plates.)
Newark Wire Cloth Co., 351 Verona Ave., Newark, N. J. (Screens.)

RADIO WIRING HARNESS

Special wiring cable and harness assemblies for radio battery connections, radio tube adapter harness for converting battery operated receivers to A.C. operation; Socket Adapters for Power Tubes; Loud Speaker Extension Cords—This heading also includes auto ignition assemblies.

Afco. See American Fabric Co.
Ajax Elec. Specialty Co., 1926 Chestnut, St. Louis, Mo.
Alden Mfg. Co., Brockton, Mass. (Adapters.)
Alpbus. See Alpha Wire Corp.
Alpha Wire Corp., 520 Broadway, New York, N. Y.
Alpstrand. See Alpha Wire Corp.
American Braiding Co., Holyoke, Mass.
Belden Mfg. Co., 4633 W. Van Buren, Chicago, Ill.
Birnbach Radio Co., 254 W. 31st St., New York, N. Y.
Blue Ribbon. See Crescent Braid, Inc.
Brach Mfg. Co., L. S., Newark, N. J.
Connectoralds. See Alden Mfg. Co.
Cornish Wire Co., 30 Church, New York, N. Y.
Corwico. See Cornish Wire Co.
Crescent Braid, Inc., Providence, R. I.
Crescent Insulated Wire & Cable Co., Trenton, N. J.
De Luxe, 50 W. Houston, New York, N. Y.
Diamond Braiding Mills, Chicago Heights, Ill.
Echo. See Cornish Wire Co.
Enterprise Mfg. Co., Third & Dauphin Sts., Philadelphia, Pa. (Adapters).
Frost, Inc., Herbert H., 1142 W. Beardsley, Elkhart, Ind. (Adapters.)
Hatfield Rubber Wks., Inc., Hillside, N. J.
Lusterized. See American Braiding Co.
Manhattan Insulated Wire Co., 17 W. 60th St., New York.
Power, Inc., Harold J., Medford Hillside, Mass. (Adapters).
Radio Receptor Co., 106 Seventh Ave., New York, N. Y. (Adapters.)

Gage List of
Electrical Buyers
The Trade Authority

Riga. See Birnbach Radio Co.
Sterling Mfg. Co., 2831 Prospect Ave., Cleveland, Ohio (Adapters).
Wilkens Mfg. Co., 52 Orawaupan St., White Plains, N. Y.

RADIUM POWDER AND PAINT

Radium Dial Co., 3332 Forbes, Pittsburgh, Pa.
Undark. See United States Radium Corp.
United States Radium Corp., 535 Pearl, New York, N. Y.

RANGE SWITCHES, Rotary Snap. See Switches, Snap, Heavy Duty.

RAWHIDE GEARS. See Gears & Pinions, Rawhide.

READING LAMP BASES. See Bases, Reading Lamp.

REAMERS, Pipe. See Stocks, Dies and Reamers.

RECEPTACLES, Lamp. See Sockets and Receptacles.

RECEPTACLES, Plug, Heavy Duty

KEY

Battery Charging ..... See B
Floor Boxes ..... See F
Welding ..... See W
Machine Tool ..... See W
Watertight, Marine, Mine ..... See M
Car Trailer Connection ..... See C
Extension ..... See E

A. B. C. See Anderson Mfg. Co.
Adam Electric Co., Frank, St. Louis, Mo. F
Adapti Co., 2098 E. 72nd, Cleveland, O.. F
Anderson Mfg. Co., Albert & J. M., 289 A, Boston, Mass. ..... B W M .. E
Appleton Elec. Co., 1703 Wellington Ave., Chicago, Ill. ..... M
Arktite. See Crouse-Hinds Co.
Arnessen Electric Co., 13 Water, New York ..... M
Arrow Electric Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn.. F B W
Auth Electrical Specialty Co., 422 E. 53rd, New York, N. Y. ..... E
Benjamin Elec. Mfg. Co., Des Plaines, Ill. F .. W M
Bryant Elec. Co., 1421 State, Bridgeport, Conn. (Also Range Type.) ..... W
Campbell. See Steel City Elec. Co.
Cannon Elec. Development Co., 420 West Ave., 33, Los Angeles, Cal. ..... F
C. E. M. Co. See Conn. Elec. Mfg. Co.
C. H. See Cutler-Hammer Mfg. Co.
Circle F Mfg. Co., Trenton, N. J. ..... M
Conduletto. See Crouse-Hinds Co.
Connecticut Elec. Mfg. Co., Bridgeport, Conn. ..... F
Cory & Son, Chas., 183 Varick, New York ..... M
Crouse-Hinds Co., Syracuse, N. Y. ..... B W
Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee, Wis. ..... F
Electric Service Supplies Co., 17th & Cambria Sts., Philadelphia, Pa. C
Fielding. See Stanley & Patterson.
Fountain's. See Jenkins Mfg. Co.
Fullman Mfg. Co., Latrobe, Pa. ..... F
Fullman. See Steel City Elec. Co.
General Elec. Co., Merchandise Dept., Bridgeport, Conn. ..... B
Gleason & Co., J. L., 241 Franklin, Boston, Mass. ..... E
H. & H. See Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co.
Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn. .. B W
Hessl Co., W. F., 76 Greenwich, New York, N. Y. ..... W M .. E
Hubbell, Inc., Harvey, Bridgeport, Conn. (Also Range Type.) ..... B W
Indestructible. See Kliegl Bros. Universal
Jenkins Mfg. Co., Bloomfield, N. J. ..... E
Kliegl Bros. Universal Elec. Stage Lighting Co., 321 W. 50th, New York, N. Y. F B W
Latrobe. See Fullman Mfg. Co.
Lexington Electric Products Co., 12 Chapel, Newark, N. J. C
Loeffelholz & Co., Milwaukee, Wis. C
Major Equipment Co., 4603 Fullerton Ave., Chicago, Ill. ..... M
Neco. See Novelty Elec. Co.
NePage McKenny Co., Seven Front, Seattle, Wash. ..... F
Novelty Elec. Co., Tenth & Cherry Sts., Philadelphia, Pa. C
Ostrander Elecl. Works, W. R., 911 Atlantic Ave., Brooklyn, N. Y
Perkins. See Bryant Elec. Co.
Preset. See Walker Bros. Co.
Pyle National Co., 1334 N. Kostner Ave., Chicago, Ill. ..... W M C E
Quadrangle Mfg. Co., 32 S. Peoria, Chicago, Ill. (Combination wall bracket and convenience outlet.) ..... E
Rales Mfg. Co., 123 N. Albany Ave., Chicago, Ill. ..... E
Russell & Stoll Co., 53 Rose, New York F B W M .. E
Square D. Co., Detroit, Mich. ..... W
Stanley & Patterson, 150 Varick, New York, N. Y. ..... F
Steel City Elec. Co., Pittsburgh, Pa.. F ..... E
Thomas & Betts Co., 15 Park Place, New York, N. Y. ..... F
V. T. Fittings Co., 711 Cherry, Philadelphia, Pa. ..... M
Walker Bros., 12 E. 41st St., New York, N. Y. ..... F
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa. ..... F B W M
Yale. See Electric Products Co.

RECORDERS, Elapsed Time. See Indicators, Operation.

REDUCERS, Socket. See Socket Reducers.

REFLECTOR LENSES. See Lenses.

REFLECTORS, Porcelain Enameled, Steel

ABolite Reflector Co., West Lafayette, Ohio.
Aga Auto Lamp Co., Amesbury, Mass.
Benjamin Elec. Mfg. Co., Des Plaines, Ill.
Cello, Inc., 96 Prince, New York, N. Y.
Dunlap Co., John, Carnegie, Pa.
Durex. See Wheeler Reflector Co.
Federal Electric Co., 8700 S. State, Chicago, Ill.
Goodlites. See Goodrich Elec. Co.
Goodrich Elec. Co., 2935 N. Oakley Ave., Chicago, Ill.
Isolux. See Wheeler Reflector Co
Jumbo. See Quadrangle Mfg. Co.
Marbelite Art Products Co., 17 N. Robey, Chicago, Ill.
Monk, H. E., 18 Warren, New York, N. Y.
Multi Elecl. Mfg. Co., 210 N. Ogden Ave., Chicago, Ill.
Oamed. See Overbaugh & Ayers.
Overbaugh & Ayers, 411 S. Clinton, Chicago, Ill.
Para Steel. See Wheeler Reflector Co.
Perfection. See Tindall & White.
Quad. See Quadrangle Mfg. Co.
Quadrangle Mfg. Co., 32 S. Peoria, Chicago, Ill.
Reliability. See ABolite Reflectors Co.
Richardson Reflector Co., 16 Hudson, New York, N. Y.
Sturdox. See Benjamin Elec. Mfg. Co.

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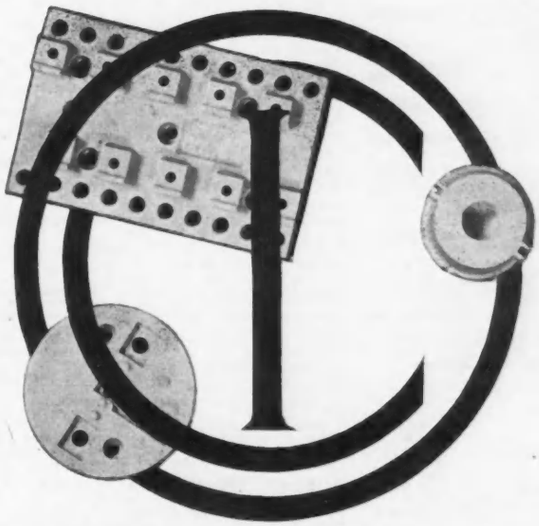

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9. Rheostats for all purposes.
10. Speed Controllers.
11. Theatre Dimmers.

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REFLECTORS, Porcelain Enameled Steel—Continued
Tindall & Wiese, 43 W. 60th, New York, N. Y.
Vaporlux. See Wheeler Reflector Co.
Westinghouse Elec. & Mfg. Co., South Bend, Ind.
Wheeler Reflector Co., 275 Congress, Boston, Mass.

REFRACTORIES, Porcelain. See Cores Resistance Coil.

REFRIGERANTS. See Chemicals, Refrigeration.

REFRIGERATION CHEMICALS. See Chemicals, Refrigeration.

REFRIGERATOR CABINETS

Airtite. See Rhinelander Refrigerator Co.
Alaska Refrigerator Co., Muskegon, Mich.
American Refrigerator Corp., Peru, Ind.
Arlington Refrigerator Co., Arlington, Vt.
Athermos. See Gurney Refrigerator Co.
Baldwin Refrigerator Co., Burlington, Vt.
Banta Refrigerator Co., Clearfield, Pa.
Belding-Hall ElectrICE Corp., Belding, Mich.
Benjamin Elec. Mfg. Co., Des Plaines, Ill.
Bohn Refrigerator Co., St. Paul, Minn.
Cavalier. See Tennessee Furniture Co.
Champion Refrigerator Co., 206 Lexington Ave., New York.
Crystal Refrigerator Co., Fremont, Neb.
Crystseel. See Benjamin Elec. Mfg. Co.
Dry-Air. See Baldwin Refrigerator Co.
Eddy & Sons Co., D., 336 Adams, Boston, Mass.
Erie Art Metal Co. & Erie Metal Furniture Co., Erie, Pa.
General Necessities Corp., General Necessities Bldg., Detroit, Mich.
Gibson Refrigerator Co., Greenville, Mich.
Gloekler Co., Bernard, 1627 Penn Ave., Pittsburgh, Pa.
Gurney Refrigerator Co., Fond du Lac, Wis.
Harder Refrigerator Corp., Cobleskill, N. Y.
Heintz Mfg. Co., Front & Olney Aves., Philadelphia, Pa.
Heinz & Munschauer, Superior and Randall, Buffalo, N. Y.
Herrick Refrigerator Co., 1805 River, Waterloo, Iowa.
Hibbard Cabinets, Inc., 6504 Euclid Ave., Cleveland, O.
Holderle Bros., Inc., 339 Exchange, Rochester, N. Y.
Howe Scale Co., Rutland, Vt.
Jewett Refrigerator Co., Buffalo, N. Y.
Kingston. See Lorillard Refrigerator Co
Kleen Kold. See Harder Refrigerator Corp.
Knox. See Erie Art Metal Co.
Leonard Refrigerator Co., Div. of Kelvinator Corp., Grand Rapids, Mich.
Liver & Co., C. B., Omaha, Neb.
Loeber Co., Henry G., 151 E. 126th, New York, N. Y. (Ice Cream Cabinet.)
Lorillard Refrigerator Co., 40 Cooper Square, New York.
Louisville Refrigerator Corp., 4460 Louisville Ave., Louisville, Ky.
Louisville Tin & Stove Co., Louisville, Ky.
Mace & Co., L. H., 55 E. 150th, New York, N. Y.
Maine Mfg. Co., Nashua, N. H.
McCray Refrigerator Sales Corp., 2844 Lake St., Kendallville, Ind.
Mowatt Refrigerator Co., 25 Oak Grove, San Francisco, Cal.
Omaha Fixture & Supply Co., 11th and Douglas, Omaha
Oreole. See Ottenheimer Bros.
Ottenheimer Bros., Baltimore, Md.
Reol. See Ottenheimer Bros.
Reolite. See Ottenheimer Bros.
Rhinelander Refrigerator Co., Rhinelander, Wis.
Sanitary Refrigerator Co., Fond du Lac, Wis.
Schmidt Co., C., John and Livingston, Cincinnati, O.
Seeger Refrigerator Co., St. Paul, Minn.
Steeprost. See Heintz Mfg. Co.
Success Mfg. Co., Gloucester, Mass.
Tennessee Furniture Co., Chattanooga, Tenn.
Vogt. See General Necessities Corp.
Ward Refrigerator Co., 6901 S. Alameda, Los Angeles, Cal
White Mountain. See Maine Mfg. Co.
White Seal. See Louisville Refrigerator Co.

REFRIGERATOR CONDENSER UNITS. See Condenser Units, Refrigerator.

REFRIGERATOR FITTINGS

Commonwealth Brass Corp., 5781 Commonwealth Ave., Detroit, Mich.

REGULATORS, Temperature

American Radiator Co., 1807 Elmwood Ave., Buffalo, N. Y. (Mercury Switch Type.)
American Telethերm Co., 1017 Summit, Toledo, O.
American Thermostat Co., 226 Jelliff Ave., Newark, N. J.
Automatic Electric Heater Co., 1706 Race, Philadelphia, Pa. (Furnace.)
Automatic Reclosing Circuit Breaker Co., Columbus, O.
Boston Machine Wks. Co., 7 Willow, Lynn, Mass.
Bristol Co., Platters Bridge & Naugatuck Rd., Waterbury, Conn.
Brown. See Electric Automatic Appliance Co.
Brown Instrument Co., Wayne & Windrim, Philadelphia.
Ceace. See Cobb Electric Appliance Co.
Cobb Electric Appliance Co., 100 Massachusetts Ave., Boston.
Cook Elec. Co., 2700 Southport Ave., Chicago, Ill.
Davis & Daggett Co., 238 Dwight, Springfield, Mass.
D. & T. Manufacturing Co., 3001 La Salle, St. Louis, Mo.
Dunco. See Struthers Dunn, Inc.
Electric Automatic Appliance Co., Denver, Col.
Engelhart, Chas., 90 Chestnut, Newark, N. J.
Fabrice Thermostatic Control Co., 4750 Sheridan Rd., Chicago, Ill.
Gifford Heat Control Systems, 1 Broadway, New York.
Gold Car Htg. & Ltg. Co., 220 36th, Brooklyn, N. Y.

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Hart Mfg. Co., Hartford, Conn.
Hermansen Elect. Co., 505 W. 41st, New York, N. Y.
Hynes & Cox Elec. Corp., 406 N. Pearl, Albany, N. Y.
Jewell Mfg. Co., Auburn, N. Y.
Johnson Service Co., 149 Michigan, Milwaukee, Wis.
Lockswitch. See Time-O-Stat Controls Co.
Majestic Electric Appliance Co., San Francisco, Cal.
Marvel. See American Thermostat Co.
Mercoid Corp., 564 W. Adams, Chicago, Ill. (Mercury Switch.)
Minneapolis-Honeywell Regulator Co., 2753 Fourth Ave., Minneapolis, Minn.
Penn Electric Switch Co., Des Moines, Iowa.
Penn Heat Control Corp., 15 & Chestnut Sts., Philadelphia, Pa.
Powers Regulator Co., 2720 Greenview Ave., Chicago, Ill.
Protectostat. See Minneapolis-Honeywell.
Quick Freeze. See Penn Electric Switch Co.
Ranco. See Automatic Reclosing Circuit Breaker Co.
Savutime Devices, Inc., 88 Manhattan, Rochester, N. Y.
Simplex Heat Regulator, 2935 Pillsbury Ave., Minneapolis.
Snapon. See Tagliabue Mfg. Co.
Struthers Dunn, Inc., 138 N. Juniper, Philadelphia, Pa.
Sure Fire. See Boston Machine Wks.
Tagliabue Mfg. Co., C. J., 18 33rd, Brooklyn, N. Y.
Time-O-Stat Controls Co., Cramblet Engineering Div., 236 Milwaukee Ave., Milwaukee, Wis.
Trent Co., Harold E., 439 N. 12th, Philadelphia, Pa.
Webster Elec. Co., Racine, Wis.
White Mfg. Co., 2362 University Ave., St. Paul, Minn.
Wilcolator Co., Newark, N. J.
Wilson-Maulin Co., 383 Concord Ave., New York, N. Y.

REGULATORS, Voltage

American Instrument Co., 774 Girard, N. W., Washington, D. C.
Anderson & Co., C. J., 212 W. Austin Ave., Chicago, Ill.
Marshall Electric Co., Elkhart, Ind.
Rotor. See Ward-Leonard Electric Co.
Stater Co., 19 New Park Ave., Hartford, Conn.
Ward-Leonard Electric Co., 31 South, Mount Vernon, N. Y. (See also Circuit Breakers and Thermostats.)

RELAYS

American Brown Boveri Elec. Corp., Camden, N. J.
Automatic Switch Co., 154 Grand, New York, N. Y.
Benjamin Elec. Mfg. Co., Des Plaines, Ill.
Burke Controller Co., 369 Lexington Ave., New York, N. Y.
Electric B-G Products Co., Ithaca, Mich.
Dunco. See Struthers Dunn, Inc.
General Electric Co., Schenectady, N. Y.
Leach Relay Co., 860 S. Los Angeles, Los Angeles, Cal.
McWilliams. See Electric B-G Products Co.
Roller-Smith Co., 239 Broadway, New York, N. Y.
Signal Engineering & Mfg. Co., 146 W. 14th, New York
Struthers Dunn, Inc., 138 N. Juniper, Philadelphia, Pa.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.
Wilcolator Co., Newark, N. J.

REMOTE CONTROL SWITCHES. See Switches, Remote Control.

REMOVERS, Coil

Ewing Mfg. Company, Middleport, Ohio.

RESISTANCE

Boxes. See Instruments, Laboratory Standard
Coil Cores. See Cores, Resistance.
Test Sets. See Instruments
Units, Radio. See Radio Circuit Components
Units. See Units, Rods & Grids.
Wire. See Wire Bare.

RESISTORS

Hardwick, Hindle, Inc., 215 Emmett, Newark, N. J.
Ohmite Mfg. Co., 633 N. Albany Ave., Chicago, Ill.
Ward Leonard Electric Co., 31 South, Mount Vernon, N. Y.

RESISTORS. See Units, Rods & Grids.

RESURFACERS, Commutator. See Stones, Commutator, also Tools, Commutator Truing.

REVOLUTION COUNTERS. See Tachometers.

RHEOSTATS,
Motor-Controlling. See Controllers, also Rheostats.
Radio. See Radio Receiver Parts.
Sewing Machine. See Controllers.

RHEOSTATS

	KEY
Battery Charging	See B
Stage Dimming	See D
Meter Testing (Laboratory)	See L
Plating Tank	See P
Motion Pictures (Projector Lamp)	See M
Motor Starting, Field and Speed Regulating	See F

F B D P M L

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vitreous enamelled for protection and long life.
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WARD LEONARD ELECTRIC CO.
31-41 *South St., Mount Vernon, N. Y.*

Allen-Bradley Co., 494 Reed, Milwaukee L
Biddle, James G., 1209 Arch, Philadelphia L
Brach Mfg. Corp., L. S., Newark, N. J. (Radio Battery Control.) . . . . . B . . . . .
Bradleystat. See Allen-Bradley Co.
Columbia Electric Mfg. Co., 1292 E. 52nd, Cleveland, O. . . . . P . . .
Controllite. See Ward Leonard Elec. Co.
Crown Rheostat & Supply Co., 1908 Maypole Ave., West Chicago, Ill. . . . . P . . .
Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee, Wis. . . . . F B D . . . L
Economic Rheostat Switch Co., 3551 N. 5th, Philadelphia, Pa. . . . . F . . . . . .
Electric Controller & Mfg. Co., 2700 E. 79th, Cleveland, O. . . . . F . . . . . .
Electric Products Co., 1735 Clarkstone Rd., Cleveland, O. . . . . B . . . . .
General Electric Co., Schenectady, N. Y. F L
Hanson-Van Winkle-Munning Co., Matawan, N. J. . . . . P . . .
Holzmuller, C. J., 1108 Howard, San Francisco, Cal. . . . . D . . . . .
Kliegl Bros. Universal Elec. Stage Lighting Co., 321 W. 50th, New York, N. Y. . . . D . . M . .
Knoeller Elec. Co., De Pere, Wis. . . . . F . . . . . .
National Elec. Controller Co., 5315 Ravenswood Ave., Chicago. . . . . F B D . . M L
Optimus. See Hanson-Van Winkle-Munning Co.
New York, N. Y. . . . . M . .
Rubicon Co., 29 W. Sixth, Philadelphia. L
Schaefer Bros. Co., 1059 W. 11th, Chicago . . B . . . . . .
Simplicity. See Cutler-Hammer Mfg. Co.
Robertson, Leo F., Inc., 532 W. 22nd,
Union Elec. Mfg. Co., 934 Juneau Ave., Milwaukee, Wis. . . . . F . . . . . .
Universal. See Ward Leonard Elec. Co.
Vitrohm. See Ward Leonard Elec. Co.
Ward Leonard Elec. Co., 31 South, Mt. Vernon, N. Y. . . . . F . . D . . M . .
Watton. See Electric Products Co.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa. . . . . F . . . . . M . .

RINGS Seal. See Packing.

RIVETS

Aluminum Co. of America, 2444 Oliver Bldg., Pittsburgh.
American Brass Co., Waterbury, Conn.
Blake & Johnson Co., 1497 Thomaston Ave. (Waterville), Waterbury, Conn.
Chase Brass & Copper Co., Waterbury, Conn.
Chicago Rivet & Specialty Co., 1830 S. 54th, Chicago, Ill.
Hassall, Inc., John, 402 Oakland, Brooklyn, N. Y.
Hungerford Brass & Copper Co., Div. of The Chase Brass Companies, Inc., 25 Lafayette, New York, N. Y.
Manufacturers Belt Hook Co., 1315 W. Congress, Chicago, Ill.
Nelson Rivet Co., Taunton, Mass.
Stimpson Co., Edwin B., 70 Franklin Ave., Brooklyn, N. Y.
Thomson Mfg. Co., Judson L., Waltham, Mass.
Tubular Rivet & Stud Co., 87 Lincoln, Boston, Mass.
Waterbury Brass Goods Co., Waterbury, Conn.
Wright & Corson Mfg. Co., Bridgeport, Conn.

RODS, Resistance. See Units, Rods and Grids.

ROLLER BEARINGS. See Bearings, Ball and Roller.

ROLLS, Coil Flattening

Columbia Machine Tool Works & Malleable Iron Co., Atlantic Ave. and Chestnut St., Brooklyn, N. Y.

RUBBER BELTS. See Belts, Rubber.

RUBBER, Hard

Hard Rubber, Ebonite, Vulcanite.
Aetna Rubber Co., 815 E. 79th, Cleveland, O.
American Hard Rubber Co., 11 Mercer, New York, N. Y.
Connecticut Hard Rubber Co., West Haven, Conn.
Goodrich Rubber Co., B. F., Akron, O.
Insuline Corp. of America, 78 Cortlandt, New York, N. Y.
Luzerne Rubber Co., Muirhead, near Dewey, Trenton, N. J.
Mahoganite. See American Hard Rubber Co.
New York Hard Rubber Turning Co., 212 Centre, New York.
Panelyte Corp., Trenton, N. J.
Radiolite. See Superior Hard Rubber Co.
Stokes Rubber Co., Trenton, N. J.
Superior Hard Rubber Co., Butler, N. J.
United States Rubber Co., 1790 Broadway, New York, N. Y.
Vulcanized Rubber Co., 251 4th Ave., New York, N. Y.
Vulco Panels. See Vulcanized Rubber Co.

RUBBER, MECHANICAL GOODS

Goodrich Rubber Co., B. F., Akron, O.
Manhattan Rubber Mfg. Co., Passaic, N. J.
Republic Rubber Co., Youngstown, O.
Rodale Mfg. Co., 200 Hudson, New York, N. Y.
Sun Rubber Co., Barberton, O.
Toycraft Rubber Co., Dept. W., Ashland, O.

RUBBER, SEMI-HARD. See Rubber Mechanical Goods.

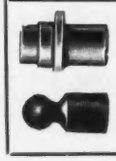
RUBBER, Sponge

Sun Rubber Co., Barberton, O.
Toycraft Rubber Co., Dept. W., Ashland, O.

RUBBER TAPE. See Tape, Rubber and Friction.

RUBBER TUBING. See Tubing, Rubber.

RUST PROOFING. See Plating & Finishing.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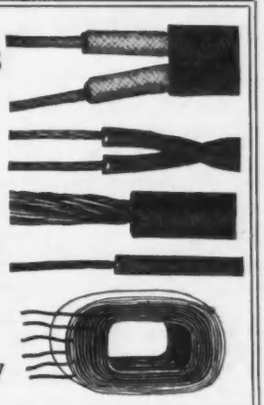

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SAL AMMONIAC. See Chemicals, Battery.
SALTS, Battery. See Chemicals, Battery.
SATURATING TANKS. See Wire Manufacturing Machines
SCREW SHELLS, Socket. See Shells, Screw Socket.

SCREW DRIVING MACHINES
Vim Electric Tool Co., 149 Broadway, New York, N. Y.

SCREW MACHINE PRODUCTS
Aluminum Co. of America, 2444 Oliver Bldg., Pittsburgh, Pa
American Metal Wks., 4865 Stanton Ave., Philadelphia, Pa.
Barnes Co., Wallace, Bristol, Conn.
Blake & Johnson Co., 1497 Thomaston Ave., Waterville.
Blake & Johnson Co., 1497 Thomaston Ave. (Waterville), Waterbury, Conn.
Bridgeport Brass Co., 774 E. Main, Bridgeport, Conn.
Brighton Screw & Mfg. Co., 1456 Harrison Ave., Cincinnati, O.
Chapman Machine Co., Terryville, Conn.
Chase Brass & Copper Co., Waterbury, Conn.
Colonial-Premier Co., 225 W. Ohio, Chicago, Ill.
Continental-Diamond Fibre Co., Bridgeport, Pa.
Eureka Tool & Machine Co., Newark, N. J.
Faries Mfg. Co., Decatur, Ill.
Hanson, Einar R., 17 Hermon, Worcester, Mass.
Hartford Machine Screw Co., 476 Capitol Ave., Hartford, Conn.
Hubbell, Inc., Harvey, Bridgeport, Conn.
Interstate Products Corp., 503 Mulberry, Newark, N. J.
Linden & Co., 891 Broad, Providence, R. I.
Mattatuck Mfg. Co., Waterbury, Conn.
Meisel Press Mfg. Co., 944 Dorchester Ave., Boston, Mass.
Olsen Mfg. Co., 58 Commercial, Worcester, Mass.
Parent Machine & Screw Co., 50 Canal, Salem, Mass.
Pheoll Mfg. Co., 5700 Roosevelt Rd., Chicago, Ill.
Plume & Atwood Mfg. Co., 414 Bank, Waterbury, Conn.
Progressive Mfg. Co., Torrington, Conn.
Scovill Mfg. Co., Waterbury, Conn.
Screw Machine Products Corp., Providence, R. I.
Shimer & Sons, Samuel J., Milton, Pa.
Steiner & Co., 297 Washington, Newark, N. J.
Thomaston Mfg. Co., Thomaston, Conn.
Waterbury Brass Goods Corp., Waterbury, Conn.
Wilmington Fibre Specialty Co., Wilmington, Del.

SCREWS, Cap (Cut Thread)
Bristol Co., Waterbury, Conn.
Hartford Machine Screw Co., Hartford, Conn.

SCREWS, Drive
Parker-Kalon Corp., Dept. K., 190 Varick, New York, N. Y.

SCREWS, Machine
Blake & Johnson Co., 1497 Thomaston Ave. (Waterville), Waterbury, Conn.
Chicago Nut Mfg. Co., 2513 Cullerton, Chicago, Ill.
Clark Metal Products, Inc., 450 Hancock Ave., Bridgeport, Conn.
Elco Tool & Screw Corp., 1818 Broadway, Rockford, Ill.
Hubbell, Inc., Harvey, Bridgeport, Conn.
New England Screw Co., Dept. A, 44 Farnsworth, Boston.
Pheoll Mfg. Co., 5700 Roosevelt Rd., Chicago, Ill.
Progressive Mfg. Co., Torrington, Conn.
Scovill Mfg. Co., Waterbury, Conn.
Screw Machine Products Corp., Providence, R. I.
Strong, Carlisle & Hammond, 1392 W. Third, Cleveland, O.

SCREWS, Machine (Cut Thread)
American Screw Co., Providence, R. I.

SECOHMMETERS. See Instruments, Laboratory Standard.
SEGMENTS. See Discs, Armature.

SEPARATORS, Storage Battery
Campbell Elec. Co., Kansas City, Mo.
Carlile & Doughty, 2530 N. Broad, Philadelphia, Pa.
Chattanooga Battery Box Co., Chattanooga, Tenn.
Certified. See Ermet Products Co.
Ermet Products Co., Sherman Drive & 16th, Indianapolis, Ind. (Wood.)
Estes & Sons, E. B., 25 Vanderbilt Ave., New York. (Wood.)
Indianapolis Box & Separator Co., 1450 E. 19th St., Indianapolis, Ind. (Wood.)
Indianapolis Mfg. Co., Indianapolis, Ind.
Inseco. See Indianapolis Box & Separator Co.
Link & Hemrick, Inc., 555 W. 52nd, New York, N. Y.
Red Band. See Indianapolis Mfg. Co.
Stewart Mfg. Co., Wm. E., 14th & Elm, Flint, Mich. (Wood.)
Wick Lumber Co., B., 539 W. 52nd, New York. (Wood.)

SHADES
Aluminum. See Shades, Metallic.
Asbestos. See Shades, Fabric.
Bamboo. See Shades, Fabric.
Brass. See Shades, Metallic.
Cast Metal. See Shades and Domes.
Copper. See Shades Metallic.
Cretonne. See Shades, Fabric.
Leaded. See Shades and Domes.
Leather. See Shades, Fabric.
Linen. See Shades, Fabric.
Mica. See Shades, Mica.
Molded. See Molded Insulation.
Mosaic. See Shades and Domes.
Paper. See Shades, Fabric.
Parchment. See Shades, Fabric.
Silk. See Shades, Fabric.
Stamped Metal. See Shades, Metallic; also Shades and Domes.
Steel. See Shades, Metallic.
Tin. See Shades, Metallic.
Zinc. See Shades, Metallic.

SHADES, Fabric
Asbestos Cretonne, Leather, Linen, Paper, Silk, Bamboo Parchment.
Acme Lamp Shade Co., 630 West Jackson Blvd., Chicago. (Silk.)
Adelphi Lamp Shade Co., 242 Fifth Ave., New York. (Silk.)
Admiration Lamp Shade Co., 160 Madison Ave., New York. N. Y. (Silk.)
Andrews Co., C. M., 32 E. 30th, New York, N. Y. (Silk.)
Art Lamp Shade Studios, 316 Fifth Ave., New York, N. Y.
Audrey Art Shade Studios, 105 Thatford Ave., Brooklyn.
Block & Co., L. D., 37 E. 18th St., New York, N. Y.
Borghese. See Hall, Chas.
Clark, H. W., 813 Fourth Ave. N., Troy, N. Y. (Parchment.)
Daiger Co., Charles V., 76 Essex, Boston, Mass. (Silk.)
Eastern Art Shop, 14 W. 19th, New York. (Parchment.)
Foss Parchment Shade Studio, 1338 E. 12th, Oakland, Cal. (Parchment.)
Foslite. See Foss Parchment Shade Studio.
Frostelene. See Art Lamp Shade Studios.
Gibson Art Co., 223 W. Fourth, Cincinnati, Ohio. (Paper.)

Fair Haven Marble & Marbleized Slate Co.
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Quarries:
Monson, Maine
Office, Portland, Maine

Hall, Chas., 3 E. 40th, New York, N. Y. (Paper Parchment.)
Hanson Co., Paul, 15 E. 26th, New York, N. Y. (China.)
Harris Mfg. Co., 122 University Place, New York, N. Y. (Parchment.)
Herco Art Mfg. Co., Meriden, Conn.
Hoft Studio, 46 W. 21st, New York, N. Y. (Parchment.)
Idealite Lamp Shade Mfg. Co., 49 55 Fremont, Jersey City, N. J. (Parchment.)
Kapa Sheti. See Wardwell, E. H.
Kerwin. See Hall, Chas.
Kno-Glair. See Hamilton, M. E.
Lamb Bros. & Greene Corp., Napannee, Ind. (Silk.)
Luxrite. See John H. St. John.
Maxwell-Ray Co., Milwaukee, Wis. (Silk.)
Monarch Lamp & Shade Co., 210 N. Second, Philadelphia, Pa. (Silk.)
Mortimura Bros., 58 W. 23rd, New York. (Bamboo, Silk, Cretonne.)
Parchment Novelty Co., 87 E. 10th, New York, N. Y. (Parchment.)
Patent Lamp Shade Co., 1361 Frankford Ave., Philadelphia.
Peerless Lamp Shade Mfg. Co., 114 E. 25th, N. Y. (Silk.)
R. D Electric Co., Fort Wayne, Ind. (Linen and Silk.)
Reuter, Wm., 32 W. 34th, New York, N. Y. (Silk.)
Rindsberger Mfg. Corp., 18 E. 24th, Chicago, Ill.
Rosita Studio, 10 W. 28th, New York, N. Y. (Parchment and Leatherette.)
Sanderson's Art Co., Milwaukee, Wis. (Parchment.)
Springel & Son, A., 26 S. 3rd, Philadelphia, Pa.
St. John, John H., 1298 Atlantic Ave., Brooklyn, N. Y. (Silk.)
Straus-Hohenstein Co., 133 W. 21st, New York. (Silk.)
Superior Lamp Shade Manufacturers, 72 Madison Ave., New York, N. Y. (Silk.)
Tombs Studios, Wm. H., 172 Pennsylvania Ave., Newark, N. J. (Parchment Paper.)
Trio Mfg. Co., 610 N. American, Philadelphia, Pa. (Silk.)
Utility Shade Co., Tenafly, N. J.
Vogue Lamp & Shade Co., 150 W. 17th, New York, N. Y. (Parchment.)
Volkman & Co., 3223 W. Lake, Chicago, Ill.
Wardwell, E. H., 11 E. 36th, New York, N. Y.

SHADES AND DOMES
Leaded, Mosaic or Figured, Stamped or Cast Metal.
Art Shade Co., 224 N. Desplaines, Chicago, Ill.
Badanes Mfg. Co., 62 Greene, New York, N. Y.
Bayley & Sons, 105 Vanderveer, Brooklyn, N. Y.
Mutual Sunset Lamp Co., 21 E. Houston, New York, N. Y.
Western Art Glass Shade Works, 101 Turk, San Francisco.

SHADES, FACTORY WINDOW. See Window Shades, Factory.

SHADES, Metallic
Tin, Aluminum, Brass, Copper, Zinc, Steel.
A. A. Elec. Mfg. Co., Bridgeport, Conn. (Sole selling agent, Harry Pickhardt, 129 W. 15th, New York, N. Y.)
Durex. See Wheeler Reflector Co.
Faries Mfg. Co., Decatur, Ill. (Brass, Aluminum, Tin, Copper.)
Frink Co., Inc., 369 Lexington Ave., New York, N. Y. (Aluminum, Brass, Zinc, Iron, Steel.)
Hubbell, Inc., Harvey, Bridgeport, Conn. (Aluminum, Brass, Steel, Tin.)
Miller Co., Meriden, Conn.
Monk, H. E., 18 Warren, New York, N. Y. (Tin, Aluminum, Brass, Copper, Zinc & Steel).
Oamco. See Overbaugh & Ayres Mfg. Co.
Overbaugh & Ayres Mfg. Co., 411 S. Clinton, Chicago, Ill.
Richardson Reflector Co., 16 Hudson, New York, N. Y.
Western Reflector Co., 1221 W. Madison, Chicago. (Tin.)
Wheeler Reflector Co., 275 Congress, Boston, Mass.

SHADES, Mica
Hirsch Mica Co., 1087 Flushing Ave., Brooklyn, N. Y.
Huse-Liberty Mica Co., 73 Long Wharf, Boston, Mass.
Kant-Krack. See Huse Liberty Mica Co.
Mica Insulator Co., 200 Varick, New York, N. Y.
Storrs Mica Co., 11 Park Place, New York, N. Y.
Tar Heel Mica Co., Plumtree, N. C.
Tarmilite. See Tar Heel Mica Co.

SHAFT COUPLINGS. See Couplings, Shaft.
SHAFTS, Flexible. See Tubing, Flexible Metallic.
SHEARS, Metal Cutting. See Shears, Power.
SHEARS, Rotary. See Shears, Power.

SHEARS, Insulation
Electric Service Supplies Co., 17th & Cambria Sts., Philadelphia, Pa.

SHEARS, Power
Niagara Machine & Tool Wks., 637 Northland, Buffalo, N. Y.

SHEET STEEL CABINETS. See Cabinets, Sheet Steel.

SHELLS, Screw Socket
Chase Brass & Copper Co., Waterbury, Conn.
Dallas Brass & Copper Co., Div. of Revere Copper & Brass Inc., 828 Orleans, Chicago, Ill.
Monowatt Electric Corp., 24 W. 40th, New York, N. Y.
Patton-MacGuyer Co., Providence, R. I.
Risdon Mfg. Co., Naugatuck, Conn.
Scovill Mfg. Co., Waterbury, Conn.
Torrington Mfg. Co., 70 Franklin, Torrington, Conn.
Waterbury Brass Goods Corp., Waterbury, Conn.

SHUNTS, Instruments. See Instruments, Laboratory Standard.

SIGN FLASHERS. See Flashers, Sign.
SIGN LETTER LENSES. See Lenses.

SILICA
Ottawa Silica Co., Ottawa, Ill. "Flint Shot."

SILK, Cloth Insulated. See Cloth & Paper.
Shades. See Shades, Fabric.
Tape. See Tape.
Thread. See Yarn, etc.

SILVER, Metal and Wire
Baker & Co., Inc., 34 Austin, Newark, N. J.
General Plate Co., Attleboro, Mass.
Gilby Wire Co., Riverside Ave., Newark, N. J.

Handy & Harman, 57 William, New York, N. Y.
Wilco. See Wilson Co., H. A.
Wilson Co., H. A., 97 Chestnut, Newark, N. J.

SILVER SOLDER. See Solder, Silver.

SINE WAVE OSCILLATORS. See Instruments, Laboratory Standard.

SIGN ELECTRODES, Gas. See Electrodes for Gas Signs.

SKINNERS WIRE. See Scrapers.

SLABS, Switchboard. See Asbestos Slabs; also Molded Insulation, Slate; Soapstone.

SLATE
For Switchboard Slabs and Barriers.
Davis Slate & Mfg. Co., 618 E. 40th, Chicago, Ill.
Electrical Specialties Corp., 50 Pearl, Boston, Mass.
Fair Haven Marble & Marbleized Slate Co., Fair Haven, Vt.
Penrhyn Slate Co., Hydeville, Vt.
Portland-Monson Slate Co., Portland, Me.
Structural Slate Co., Pen Argyl, Pa.

SLEEVE-BEARINGS. See Bearings and Bushings.

SLEEVING, Cotton. See Tape, Cotton.

SLOTTING FILES. See Files, Commutator Slotting.

SLOTTING MACHINES and TOOLS, Commutator
(Mica Undercutters).
Allen Electric & Equipment Co., Kalamazoo, Michigan.
Binghamton Flexible Shaft Co., Binghamton, N. Y.
Burton & Rogers Co., 857 Boylston, Boston, Mass.
Electric Service Supplies Co., 17th & Cambria Sts., Philadelphia, Pa.
General Electric Co., Schenectady, N. Y.
Hobart Bros. Co., Troy, Ohio.
Hullhorst Micro Tool Co., 3242G Monroe, Toledo, O.
Ideal Commutator Dresser Co., 1039 Park Ave., Sycamore, Ill.
Imperial. See Martindale Elec. Co.
Martindale Electric Co., 1262 W. Fourth, Cleveland, Ohio.
Onan, David W., 43 Royalstone Ave., Minneapolis, Minn.
Peerless. See Electric Service Supplies Co.
Ransom & Randolph Co., Superior & Chestnut, Toledo, Ohio.
Simplex. See Weidenhoff, Joseph.
South Bend Lathe Works, 425 E. Madison, South Bend, Ind.
Weidenhoff, Joseph, 4352 Roosevelt Rd., Chicago, Ill.
White Dental Mfg. Co., S. S., 152 W. 42nd, New York.

SNAP SWITCHES. See Switches, Snap

SOAPSTONE
For Switchboard Slabs and Barriers.
Alberene Stone Co., 153 W. 23rd, New York, N. Y.
Kirchberger & Co., Inc., 1425 37th, Brooklyn, N. J.
Lin-Stun. See Westinghouse.
Westinghouse Elec & Mfg. Co., East Pittsburgh, Pa.

SOCKET LININGS. See Linings, Socket

SOCKET SHELLS. See Shells, Screw Socket.

SOCKETS, Flashing. See Flashers, Sign.

SOCKET Chain Attachments
Chain Links, Chain Adjusters, Acorns, Extensions, Insulated Chain Splicers.
Abbott. See Harvey Hubbell, Inc.
Arrow Electric Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn.
Benjamin Elec. Mfg. Co., Des Plaines, Ill.
Bryant Electric Co., Bridgeport, Conn.
Duplex. See Warner Bros. Co.
Eade, John E., 104 Point, Providence, R. I. Links, Insulators.
Easylite. See Rittenhouse Co., A. E.
Economy. See Harvey Hubbell, Inc.
Flory, Wm. E., 38 W. 32nd, New York, N. Y. (Decorative Pull Chains.)
Gripper. See Wittenberg Bros.
Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn. (Metal Pull Tassel.)
Hubbell, Inc., Harvey, Bridgeport, Conn. (Links and Acorns. Metal Pull Tassels.)
Paiste. See Hart & Hegeman Mfg. Co.
Pass & Seymour, Inc., Solvay Sta., Syracuse, N. Y. (Pull Chain Tassel.)
P. & S. See Pass & Seymour, Inc.
Rittenhouse Co., A. E., Honeoye Falls, N. Y. (Sole Selling Agent, Hatheway & Co., 16 Hudson, New York, N. Y.)
Rodale Mfg. Co., 200 Hudson, New York, N. Y.
Royal. See Sears, Henry D.
Scovil Mfg. Co., Waterbury, Conn. (Acorn.)
Sears, Henry D., 50 Boylston, Boston, Mass.
Waterbury Brass Goods Co., Waterbury, Conn. (Acorns.)
Weber. See Sears, Henry D.
Wittenberg Bros., 60 Shipman, Newark, N. J. Links. Insu-

SOCKET REDUCERS
Arrow Elec. Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn.
Benjamin Elec. Mfg. Co., Des Plaines, Ill.
Candel-lite. See Sears, Henry D.
Eagle Electric Mfg. Co., 79 Hall, New York, N. Y.
Electric Co., 94 Allyn, Hartford, Conn.
General Electric Co., Merchandise Dept., Bridgeport, Conn.
Hart & Hegeman Div of Arrow-Hart & Hegeman Elec. Co. Hartford, Conn.
Murns Co., Frank W., 291 Congress, Boston, Mass.
Pass & Seymour, Solvay Sta., Syracuse, N. Y.
Propp Co., M., 524 Broadway, New York, N. Y.
Rodale Mfg. Co., 200 Hudson, New York, N. Y.
Sears, Henry D., 50 Boylston, Boston, Mass.

SOCKETS, Radio. See Radio Receiver Parts.

SOCKETS AND RECEPTACLES, Lamp
Bases other than Standard (or Medium) are indicated as follows: Mogul, M; Candelabra (or Miniature), C.

Key	See K
Composition	See W
Metal Shell	See B
Porcelain	See A
Pull Chain	See P
Push Through	See T
Sign Receptacles	See A

A. B. C. See Leviton Mfg. Co.
Acme Elec. & Mfg. Co., Canal & Hamilton Ave., Trenton, N. J. . . . . A
Ajax Elec. Specialty Co., 1926 Chestnut, St. Louis, Mo. . . . . W
Alabax. See Arrow Elec. Co.
Alcor Mfg. Co., 4605 W. Madison, Chicago, Ill. C
Appleton Electric Co., 1730 Wellington Ave., Chicago, Ill. . . . . A
Armstrong & White, 9th and Liberty Ave., Pittsburgh, Pa. . . . . A
Arrow Elec. Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn. M C K T P B A
Arrogrip. See Arrow Elec. Co
A. & W. See General Outdoor Adv. Co.

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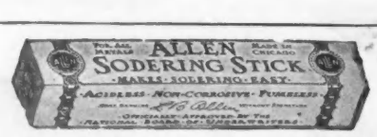

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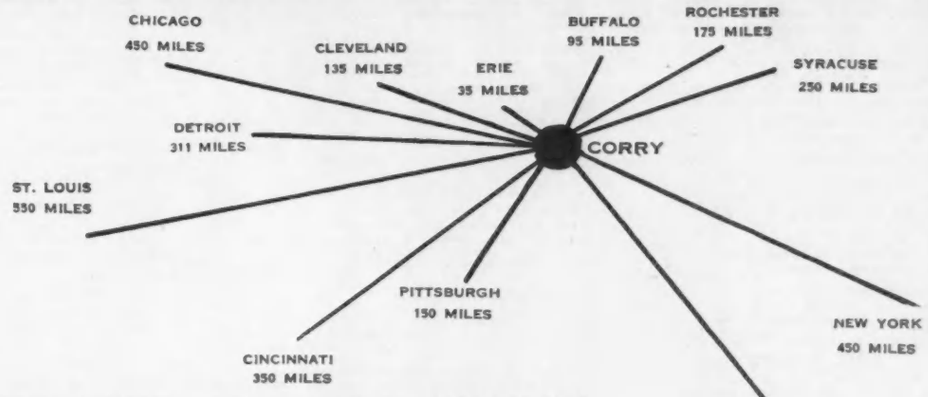

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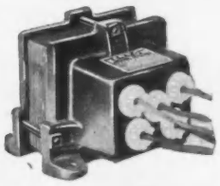

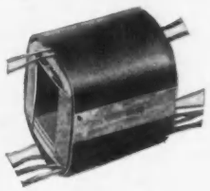

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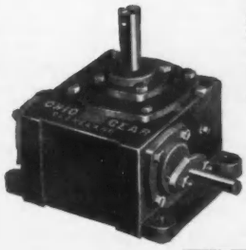

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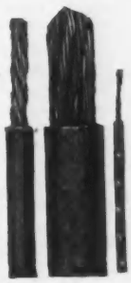

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Geuder, Paeschke & Frey, 1392 St. Paul Ave., Milwaukee.
Grammes & Sons, Inc., L. F., Allentown, Pa.
Gray Bros. Co., Piano, Ill.
Hubbard Spring Co., M. O., Pontiac, Mich.
Hubbell, Inc., Harvey, Bridgeport, Conn.
Hunter Pressed Steel Co., Lansdale, Pa.
Imperial Electrical Co., Union City, Ind.
Kirschen's Mfg. Co., 255 Calyer, Brooklyn, N. Y.
Lansing Stamping Co., Lansing, Mich.
Lenz Metal Stamping Wks., J., 199 Franklin, New York.
Massachusetts Machine Shop, Inc., Boston, Mass.
Mathews Mfg. Co., 104 Gold, Worcester, Mass.
Mattatuck Mfg. Co., Waterbury, Conn.
McDowell Mfg. Co., Millvale Sta., Pittsburgh, Pa.
Mechanics Tool & Stamping Co., 7 Summer, Worcester, Mass.
Monowatt Electric Corp., 24 W. 40th, New York, N. Y.
Mutual, See Bull Dog Elec. Products Co.
Patton-MacGuyer Co., Providence, R. I.
Paul & Beekman Mfg. Co., 1734 N. Fifth, Philadelphia, Pa.
Plume & Atwood Mfg. Co., 474 Bank, Waterbury, Conn.
Precision Metal Workers, 3100 Carroll Ave., Chicago, Ill.
Premax Products, Inc., 230 Tenth, Niagara Falls, N. Y.
Quadriga Mfg. Co., 113 W. Grand Ave., Chicago, Ill.
Risdon Mfg Co., Naugatuck, Conn.
Scovill Mfg. Co., Waterbury, Conn.
Sherman Mfg. Co., H. B., Battle Creek, Mich.
Signal Elec. Mfg. Co., Menominee, Mich.
Soss Mfg. Co., Roselle, N. J.
Steinen & Co., 297 Washington, Newark, N. J.
Thomas & Skinner Steel Products Co., 1102 E. 23rd, Indianapolis, Ind.
United Stamping & Mfg. Co., Cleveland, Ohio.
United States Stamping Co., Moundsville, W. Va.
Valley Appliances, Inc., 634 Lexington Ave., Rochester, N. Y.
Waterbury Brass Goods Corp., Waterbury, Conn.
Waterbury Button & Moulding Co., Waterbury, Conn.
Waterbury Mfg. Co., 236 Grand, Waterbury, Conn.
Waterbury Metal Wares Co., Waterbury, Conn.
Western Cartridge Co., East Alton, Ill.
Zierick Machine Wks., F. R., 68 E. 131st St., New York, N. Y.

STANDS, Armature

Columbia Machine Works & Malleable Iron Co., Atlantic Ave. and Chestnut St., Brooklyn, N. Y.
Electric Service Supplies Co., 17 & Cambria Sts., Philadelphia, Pa.
Onan, David W., 43 Royalstone Ave., Minneapolis, Minn.
Peerless. See Electric Service Supplies Co.
Ridlon Company, Frank, Boston, Mass.
Weidenhoff, Joseph, 4352 Roosevelt Rd., Chicago, Ill.

STARTERS, Motor. See Controllers, Motor; Switches, Remote Control; Switches, Knife; Safety; Switches, Snap (Heavy Duty).

STEATITE. See Cores, Resistance Coil.

STEEL CASTINGS. See Castings, Steel.

STEEL for Electric Appliances

Elyria Iron & Steel Co., Elyria, O.
Ryerson & Son, Jos., 2558 W. 16th, Chicago, Ill.

STEEL, Magnet

Ajax Electrothermic Corp., Trenton, N. J.
Hercules Elec. Steel Corp., 145 Lafayette St., New York.
Indiana Steel Products Co., 4545 S. Western Ave., Chicago.
Ludlum Steel Co., Watervliet, N. Y.
Reed Co., Jr., David, 85 Adams, Brooklyn, N. Y.
Swedmag. See Reid Co., Jr., David.

STEEL SHEETS

Agathon. See Central Alloy Steel Corp.
Allegheny Steel Co., Brackenridge, Pa.
American Sheet & Tin Plate Co., Frick Bldg., Pittsburgh.
Armco. See International Corp., Middletown, O.
Armelec. See Empire Steel Corp.
Central Alloy Steel Corp., Massillon, O.
Cyclops Steel Co., Titusville, Pa.
Dynelec. See Empire Steel Corp.
Empire Steel Corp., Mansfield, O.
Firth-Sterling Steel Co., McKeesport, Pa.
Manelec. See Empire Steel Corp.
Mayari. See Empire Steel Corp.
Newport Rolling Mill Co., Newport, Ky.
Polelec. See Empire Steel Corp.
Republic Iron & Steel Co., 335 Market, Youngstown, O.
Tranelec. See Empire Steel Corp.
Unilos. See Universal Steel Co.
Universal Steel Co., Bridgeville, Pa.
Wheeling Steel Corp., Wheeling, W. Va.

STEEL, STRIP. See Strip Steel.

STOCKS, Dies and Reamers

Hall-Will, Inc., Twelfth & Cranberry, Erie, Pa.
Ket-E-Hall. See Hall-Will, Inc.
Toledo Pipe Threading Machine Co., 1445 Summit, Toledo, O.

STONES, Commutator

Acme. See Green Equipment Corp.
Caro. See Electric Service Supplies Co.
Cleveland Stone Co., Union Trust Bldg., Cleveland, O.
Co-operative Utilities Co., 1503 Columbia Ave., Philadelphia, Pa.
Diamond Dee. See Co-operative Utilities Co.
Electric Service Supplies Co., 17th and Cambria, Philadelphia, Pa.
Green Equipment Corp., Monadnock Block, Chicago, Ill.
Ideal Commutator Dresser Co., 1039 Park Ave., Sycamore, Ill.
Imperial. See Martindale Electric Co.
Lombard & Co., Somerville, Mass.
Martindale Elec. Co., 1262 W. Fourth, Cleveland, O.

STOOLS, Factory; Steel

Angle Steel Stool Co., Plainwell, Mich.
Chicago Wire Chair Co., 615 N. La Salle, Chicago, Ill.
Royal Metal Mfg. Co., 1140 South Michigan Ave., Chicago.

STORAGE
Battery Plates. See Plates, Storage Battery.
Battery, Separators. See Separators.
Tools. See Tools, Storage Battery.

STRAINING MACHINES, INSULATION. See Wire Manufacturing Machines.

STRAIGHTENERS, Armature Shaft

Columbia Machine Works & Malleable Iron Co., Atlantic Ave. and Chestnut St., Brooklyn, N. Y.

STRANDING MACHINES. See Wire Manufacturing Machines.

STRIP STEEL

(Hot and Cold Roll)
Acme Steel Co., 2832 Archer Ave., Chicago, Ill. (Hot & Cold).
American Steel & Wire Co., 208 S. La Salle, Chicago, Ill. (Cold).
Athenia Steel Co., 135 William, New York, N. Y. (Cold.)
Barnes Co., Wallace, Bristol, Conn. (Hot.)
Central Alloy Steel Corp., Massillon, O. (Hot.)
Griffin Mfg. Co., Huron & Cherry, Erie, Pa. (Cold.)
Laclede Steel Co., 8th & Olive Sts., St. Louis, Mo. (Hot.)
Latrobe Electric Steel Co., Latrobe, Pa. (Hot & Cold.)
Republic Iron & Steel Co., 335 Market, Youngstown, O.
Sharon Steel Hoop Co., Sharon, Pa. (Hot.)
Stanley Wks., New Britain, Conn. (Hot & Cold.)
Steel and Tubes, Inc., Cleveland, O. (Hot & Cold.)
Superior Steel Corp., Union Trust Bldg., Pittsburgh, Pa. (Hot & Cold.)
Thomas Steel Co., Warren, Ohio.
West Leechburg Steel Co., Farmers Bank Bldg., Pittsburgh, Pa. (Hot & Cold.)

STRIPPERS, Wire

Acme. See A. Laubscher.
Aries Engineering Co., 115 Brown, Milwaukee, Wis. (Cutting, Stripping and Measuring).
Austin Co., M. B., 108 S. Desplaines, Chicago, Ill.
Carlander, Henry, 508 W. 146th, New York, N. Y.
Colonial-Premier Co., 229 W. Ohio, Chicago, Ill.
Dicke Tool Co., Downers Grove, Ill.
Electric Service Supplies Co., 17th & Cambria Sts., Philadelphia, Pa.
E-Z. See Pyramid Products Co.
F F. See France Mfg. Co.
France Mfg. Co., 10306 Berea Rd., Cleveland. (Motor Driven.)
Goebel. See Klein & Sons.
Hertzan. See Service Sales & Mfg. Co.
Ideal Commutator Dresser Co., 1008 Park Ave., Sycamore, Ill.
Ives Mfg. Co., Meriden, Conn.
Klein & Sons, Mathias, Chicago, Ill.
Laubscher, A., 77 Fort Pleasant Ave., Springfield, Mass.
Perfection. See Weber Machine Corp.
Pyramid Products Co., 2311 S. State, Chicago, Ill.
Service Sales & Mfg. Co., 3405 W. 159th, Cleveland, O.
Speedcraft. See Wire Stripper Co.
Thomas Steel Products Co., Warren, Ohio.
Weber Machine Corp., 33 S. Water, Rochester, N. Y.
Wire Stripper Co., 507 Erie Bldg., Cleveland, O.
Zierick Machine Wks., F. R., 6 Howard, New York City. (Motor Driven Stripper & Twister).

SWITCHBOARD INSTRUMENTS. See Instruments, Portable and Switchboard.

SWITCHBOARD OPALS. See Lenses

SWITCHBOARDS, SLABS AND BARRIERS
See Asbestos Slabs; Molded Insulation; Slate; Soapstone.

SWITCH (Switches)
Arms. See Posts, Binding.
"Across the Line" Type. See Controllers, Motor.
Baby Knife. See Switches, Battery.
Battery. See Switches, Battery.
Canopy. See Switches, Snap.
Clock Operated. See Switches, Time.
Feed Through. See Switches, Snap.
Fixture. See Switches, Snap.
Float. See Switches, Tank.
Flush. See Switches, Snap.
Handles. See Handles, Wood
Knife, Baby. See Switches, Battery & Baby Knife.
Lever Radio. See Radio Mounting.
Lever. See Switches, Snap, Lever.
Limit. See Controllers, Motor.
Mercury. See Switches, Mercury
Motor Starting. Magnetic Type. See Controllers.
Motor Starting. Non-Magnetic. See Switches, Motor Starting.
Pendant. See Switches, Snap.
Pressure Regulating. See Controllers.
Push Button, Snap. See Switches, Snap.
Push Button, Motor Starting. See Switches, Remote Control.
Radio Receiver. See Radio Mountings.
Range. See Switches Snap; Heavy Duty
Remote Control. See Switches, Remote Control.

Reversing. See Controllers.
Rotary. See Switches, Snap.
Safety. See Switches, Knife.
Snap. See Switches, Snap.
Starter Type. See Controllers.
Storage Battery. See Switches, Storage Battery.
Surface. See Switches, Snap.
Tank. See Switches, Tank.
Time. See Switches, Time.
Toggle. See Switches, Snap.
Tumbler. See Switches, Snap.

SWITCHES, Battery and Baby Knife

Cut-Out Switches.
Anti-Wood. See Keil & Son, Francis.
Bridgeport Switch Co., 209 Center, Bridgeport, Conn.
Bryant Electric Co., Bridgeport, Conn.
Chapman. See Frank W. Morse & Co.
Chicago Elec. Mfg. Co., 2801 S. Halsted, Chicago, Ill.
Jefferson Electric Co., 1503 S. Laflin, Chicago, Ill.
Circle T. See Trumbull Elec. Mfg. Co.
Connecticut Elec. Mfg. Co., Bridgeport, Conn.
Crown. See Edwards & Co., Inc.
Cutler-Hammer, Inc., 1258 St. Paul Ave., Milwaukee.
Diamond H. See Hart Mfg. Co.
Edwards & Co., Inc., 140th & Exterior, New York, N. Y.
Electrad, Inc., 428 Broadway, New York, N. Y.
Eureka. See Frank W. Morse & Co.
Fahnestock Elec. Co., cor. East Ave. and 8th, Long Island City, N. Y.
Handy. See Chicago Elec. Mfg. Co.
H. & H. See Hart & Hegeman Div.
Hart Mfg. Co., Hartford, Conn.
Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn. (Push Button.)
Harwood. See Frank W. Morse & Co.
Heinemann Elec. Co., Trenton, N. J.
Jost. See Frank W. Morse & Co.
Kappa. See Trumbull Elec. Mfg. Co.
Keil & Son, Francis, 401 E. 163rd, New York, N. Y.
Kendrick & Davis Co., Lebanon, N. H.
Keystone. See Frank W. Morse & Co.
King Mfg. Co., B. C., 302 Park Ave., Brooklyn, N. Y.
Knox Porcelain Corp., Knoxville, Tenn.
K-P-F Elec. Co., 855 Howard St., San Francisco, Cal.
Kurz & Root, Appleton, Wis.
Leviton Mfg. Co., 226 Newell, Brooklyn, N. Y.
Lyons Mfg. Co. (Mt. Carmel), New Haven, Conn.
Majestic Elec. Mfg. Co., 80 N. 12th St., St. Louis, Mo.
Manhattan Elecl. Supply Co., 510 Sixth Ave., New York.
Morse Co., Frank W., Boston, Mass.
Partrick & Wilkins Co., Philadelphia, Pa.
Porcelain Products, Inc., Findlay, Ohio.
Powerlite Switchboard Mfg. Co., 4149 E. 79th, Cleveland, O.
Pulirite. See Frank W. Morse & Co.
Reliable Electric Co., 3145 Carroll Ave., Chicago, Ill.
Samson Electric Co., Canton, Mass.
Spero Elec. Mfg. Co., E. 33rd and Woodland Ave., Cleveland.
Sta-Rite. See Frank W. Morse & Co.
Trumbull Elec. Mfg. Co., Plainville, Conn.
Wood Elec. Co., C. D., 565 Broadway, New York, N. Y.

SWITCHES, Mercury

(For Temperature Control Apparatus.)
Con-Tac-Tor. See Time-O-Stat Controls Co.
Cramblet Engineering Div. of Time-O-Stat Controls Co., 286 Milwaukee, Milwaukee, Wis.
Dunco. See Struthers Dunn, Inc.
Fabrice Thermostatic Control Co., 4750 Sheridan Rd., Chicago, Ill.
General Electric Vapor Lamp Co., 883 Adams, Hoboken, N. J.
Leland Electric Co., Dayton, O.
Kontax. See Leland Electric Co.
Kontroler. See Leland Electric Co.
Machlett & Son, 50 William, Long Island City, N. Y.
Mercoid Corp., 564 W. Adams, Chicago, Ill.
Safety Regulator Co., 529 S. Mathews, Los Angeles, Cal.
Struthers Dunn, Inc., 138 N. Juniper, Philadelphia, Pa.
Time-O-Stat Controls Co., Elkhart, Ind.

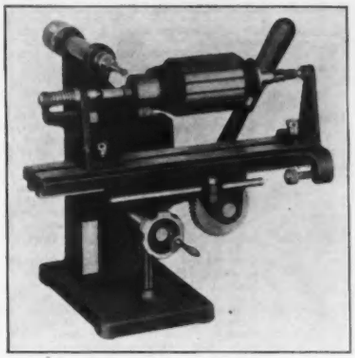
SWITCHES, Motor Starting

Accessible. See Trumbull-Vanderpoel Elec. Mfg. Co.
Aces. See Colt's Patent Fire Arms Mfg. Co.
Adam Elec. Co., Frank, St. Louis, Mo.
Aurora Steel Products Co., Aurora, Ill.
Automatic Switch Co., 154 Grand, New York, N. Y.
Barber Elec. Mfg. Co., North Attleboro, Mass.
Bull Dog Electric Products Co., Detroit, Mich.
Circle T. See Trumbull Elec. Mfg. Co.
Colt's Patent Fire Arms Mfg. Co., Hartford, Conn.
Columbia Metal Box Co., 226 E. 144th, New York, N. Y.
Crouse-Hinds Co., Syracuse, N. Y.
E. W. See Trumbull Elec. Mfg. Co.
FA. See Adam Elec. Co., Frank.
F. A. Triumph. See Metropolitan Elec. Mfg. Co.
Federal Steel Products Co., 2 Ave. L., Newark, N. J.
Large-Dail Mfg. Co., 311 N. Tenth, Philadelphia, Pa.
Leonard Elec. Mfg. Co., 2907 Perkins Ave., Cleveland, O.
Lundy Co., E. A., Fulton Bldg., Pittsburgh.
MacMillen Mfg. Co., 1400 N. Spring, Los Angeles, Cal.
Major. See Adam Elec. Co., Frank.
Mason. See Trumbull-Vanderpoel Elec. Mfg. Co.
Metropolitan Device Corp., 1250 Atlantic Ave., Brooklyn, N. Y.
Metropolitan Elec. Mfg. Co., Blvd. at 14th, Long Island City, N. Y.
Murray. See Metropolitan Device Corp.
Mutual. See Bull Dog Elec. Products Co.
Naro. See Metropolitan Elec. Mfg. Co.
Noark. See Colt's Patent Fire Arms Mfg. Co.
Nublade. See Colt's Patent Fire Arms Mfg. Co.
Palmer Elec. & Mfg. Co., Waltham, Mass.
Robbins & Myers, Inc., Springfield, O.
Safe-Lock. See Trumbull-Vanderpoel Elec. Mfg. Co.
Safelock. See Westinghouse Elec. & Mfg. Co.
Schmuckler & Sons, 2232 N. 28th, Philadelphia, Pa.
Square D Co., Detroit, Mich.
S. S. See Wadsworth Elec. Mfg. Co.
Tanner & Co., Wm. F., 511 Sharp, Baltimore, Md.
Trumbull Elec. Mfg. Co., Plainville, Conn.
Trumbull-Vanderpoel Elec. Mfg. Co., Bantam, Conn.
T. V. Safelock. See Trumbull-Vanderpoel Elec.
Unisafti. See Metropolitan Device Corp.
Unit-Versal. See Bull Dog Elec. Products Co.
Universal Metal Box & Products Co.
V. V. Fittings Co., 711 Cherry, Philadelphia, Pa.
Wadsworth Elec. Mfg. Co., Covington, Ky.
Westinghouse Elec. & Mfg. Co., Mansfield, O.

SWITCHES, Remote Control

Push Button, Magnetically Operated.
Adam Electric Co., Frank, St. Louis, Mo.
Allen-Bradley Co., 494 Reed, Milwaukee, Wis.
Anderson & Co., C. J., 212 W. Austin Ave., Chicago, Ill.
Automatic Switch Co., 154 Grand, New York, N. Y.
Burke Controller Co., 369 Lexington Ave., New York, N. Y.
Clark Controller Co., 1146 E. 152nd, Cleveland, O.
Cramer & Co., R. W., 136 Liberty, New York, N. Y.
Cutler-Hammer, Inc., 1257 St. Paul Ave., Milwaukee.
Diamond H. See Hart Mfg. Co.
Dunco. See Struthers Dunn, Inc.
Electric Valve Mfg. Co., 64 Murray, New York, N. Y.
General Electric Co., Merchandise Dept., Bridgeport, Conn.
Hart Mfg. Co., Hartford, Conn.
H. P. See Palmer Elec. & Mfg. Co.

HULLHORST



Production Machine No. 10

Simple to operate and reload—handles volume of undercutting faster and better than any other machine—equipped with strong ball bearing spindle.

Hullhorst manufactures a complete line of mica and copper slotting cutters both in high speed and carbon steel. Let us quote you on your requirements.

The Hullhorst Micro-Tool Co.
3242-G Monroe St., Toledo, O.

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THAT *DON'T* STICK . . . MAKE CUSTOMERS THAT DO

If your product depends on the accurate making and breaking of electric circuits, *watch your contacts*—use only the very best—use Fansteel Tung-Points. They *won't* stick and the users *will*.

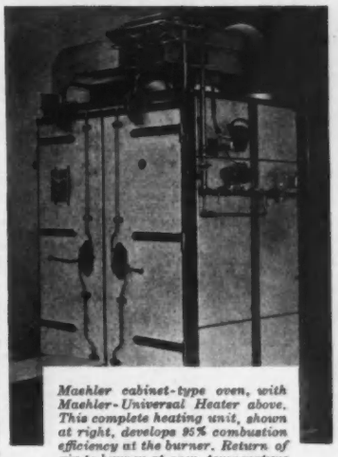
Cost is another consideration. Tungsten, or one of the other Fansteel metals, costs much less than certain expensive metals and alloys sometimes used, and they *perform even better*.

Let our engineering department study your requirements (no obligation), run special tests for you, and submit recommendations and estimates.

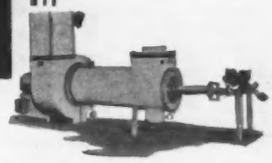
Why not write today?

FANSTEEL PRODUCTS CO., INC.
NORTH CHICAGO, ILL.
Pioneer Makers of Tungsten Contact Points

MAEHLER



Maehler cabinet-type oven, with Maehler-Universal Heater above. This complete heating unit, shown at right, develops 95% combustion efficiency at the burner. Return of air to burner at oven temperature reduces fuel consumption and increases baking speed.



ONE of the biggest factors of success in baking armatures or coils is uniformity.

Insulating varnish must be "done to a turn," and the process completed all at once to insure a satisfactory coating. If some portions of the finish bake more rapidly or more slowly than the average, "weak spots" subsequently develop in the insulation.

The superiority of products baked in ovens, equipped with Maehler-Universal Heaters, is due to the fact that *recirculated convected heat* maintains a uniform temperature, within a range of five degrees, throughout the oven. Live, active heat diffuses at low static pressure in all directions, baking every square inch of surface evenly and rapidly.

Moisture and vapors from the process are passed through the burner flame to incinerate all combustibles. This eliminates the chief cause of oven danger. A complete system of safety devices removes all other hazards.

For all phases of baking in the electrical industry, Maehler-built ovens and heaters offer advantages worth investigating.

Write for your copy of "Heat from Hazard," the key principle of scientific industrial oven heating.

THE PAUL MAEHLER CO.
2220 W. Lake Street Chicago, Illinois
Universal Economy

OVENS

SWITCHES, Remote Control—Continued
Industrial Controller Div. of Square D Co., Milwaukee, Wis.
Kato Engr. Co., Mankato, Minn.
Lincoln Elec. Co., Colt Rd. & Kirby Ave., Cleveland, O.
Major, F. A., System. See Adam Elec. Co.
Monitor Controller Co., 51 S. Gay, Baltimore, Md.
Palmer Elec. & Mfg. Co., Waltham, Mass.
Precise Mfg. Co., 254 Mill, Rochester, N. Y.
Protectoswitch. See Precise Mfg. Co.
R. C. O. C. See South Bend Current Controller Co.
Sauter. See Cramer & Co., R. W.
Signal Engineering & Mfg. Co., 146 W. 14th, New York
South Bend Current Controller Co., South Bend, Ind.
States Co., 19 New Park Ave., Hartford, Conn
Struthers Dunn, Inc., 138 N. Juniper, Philadelphia, Pa.
Takamine Corp., 208 Rawson St., Long Island City, N. Y.
Teeple Co., L. R., 540 E. Ninth, Portland, Ore.
Triplock. See Monitor Controller Co.
Trumbull Elec. Mfg. Co., Plainville, Conn.
Zenith Elec. Co., 337 S. Dearborn, Chicago, Ill.

SWITCHES, Snap

KEY

Feed Through ..... See p
Fixture (Canopy, Candelabra and Key Arm) ..... See F
Flush ..... See f
Lever, Toggle, Tumbler ..... See L
Pendant ..... See p
Push Button ..... See P
Rotary ..... See R
Surface ..... See s

See Also Switches, Snap; Heavy Duty.

Adam Electric Co., Frank, St. Louis, Mo. f . . . . . L . .
Anylite Elec. Co., Ft. Wayne, Ind. . . . . L . .
Arrow Electric Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn. . . f sp P R L F
Arrow Head. See Arrow Elec.
Beaver Mfg. Co., 625 N. Third, Newark, N. J. . . . . f p P . . . F
Best. See United States Elec. Mfg. Corp.
Brascolite. See Guth & Co., Edwin.
Bremer Elec. Mfg. Co., 159 N. 7th, Philadelphia, Pa. . . . . f . . . . . .
Bridgeport Switch Co., 209 Center, Bridgeport, Conn. . . . . L F
Bryant Elec. Co., Bridgeport, Conn. . . . . f sp P R L F
B. S. Co. See Bridgeport Switch Co.
Carling Tool & Machine Co., 32 Union Place, Hartford, Conn. . . . . F
Commercial. See Gaynor Electric Co.
Connecticut Elec. Mfg. Co., Bridgeport, Conn. . . . . p P R L F
Crouse-Hinds Co., Syracuse, N. Y. . . . . L . .
Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee, Wis. . . . . P . . . L . .
Diamond H. See Hart Mfg. Co.
Dugle. See Bryant Elec. Co.
Economy Fuse Mfg. Co., 2717 Greenview Ave., Chicago, Ill. . . . . F
Gaynor Elec. Co., Stratford, Conn. . . . . f . . . . . L . .
General Elec. Co., Bridgeport, Conn. . . . . f sp P R L F
Glo-Guide. See Bryant Elec. Co.
Gold Star Push Switch. See Hart & Hegeman.
Guth & Co., Edwin, 2615 Washington Ave., St. Louis, Mo. . . . . .
Hart Mfg. Co., Hartford, Conn. . . . . f sp P R L . .
Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co. (Door Bolt Control) f sp P R L F
Hart. See Hart & Hegeman.
H. & H. See Hart & Hegeman Mfg. Co.
Hubbell, Inc., Harvey, Bridgeport, Conn. . . sp . . . . L F
Jost. See Morse, Frank W.
Keil & Son, Francis, 401 E. 163rd, New York, N. Y. . . . . f . . P . . . . .
Leviton Mfg. Co., 226 Newell, Brooklyn . . . . . F
Levoller. See McGill Mfg. Co.
McGill Mfg. Co., Valparaiso, Ind. . . . . f . . . . . L F
Marks Products Co., 80 N. Ninth, Brooklyn, N. Y. . . . . L F
Metropolitan Elec. Mfg. Co., Blvd at 14th St., Long Island City, N. Y. . . . . s . . R . . .
Morse Co., Frank W., 291 Congress, Boston . . . P . . . . .
National. See Standard Elec. Mfg. Co.
New England. See Paulding, John L.
Nutmeg. See Hubbell, Harvey, Inc.
Operite. See Morse Co., Frank W.
Pass & Seymour, Solvay Sta., Syracuse, N. Y. . . . . f sp P . . L F
Paulding, John L. New Bedford, Mass. . . . . f s P . . . . .
Pen Tap. See Beaver Mfg. Co.
Perkins. See Bryant Elec. Co.
Pilot Radio & Tube Corp., 323 Berry, Brooklyn, N. Y. . . . . L . .
Pilotoggle. See Pilot Radio & Tube Corp.
Pilotoggle. See Pilot Elec. Mfg. Co.
Pullrite. See Morse, Frank W.
Rodale Mfg. Co., 200 Hudson, New York p . . . . . .
Sears, Henry D., 80 Boylston, Boston . . f sp P R L F
Smith & Co., T. C., 3915 Pewelton Ave., Philadelphia, Pa. . . . . P . . . . .
Snapit. See Marks Products Co.
Spartan. See Bryant Elec. Co.
Standard Elec. Mfg. Co., 941 Wrightwood Ave., Chicago, Ill. . . . . f r P R L . .
Trigle. See Bryant Elec. Co.
Tumbolier. See Hart & Hegeman.
Twi-Lite. See McGill Mfg. Co.
United States Elec. Mfg. Corp., 223 W. 114th, New York, N. Y. . . . . f . . . . . .
Victor. See Keil & Son, Francis.
Washington. See Gaynor Electric Co.
Weber. See Sears, Henry D.
Werkrite. See Morse, Frank W.
Yankee. See Bryant Elec. Co.

SWITCHES, Snap; Heavy Duty

Heavy duty rotary snap switches for Electric Range and Small Motor Control.

Arrow Elec. Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn.
Bryant Electric Co., 1421 State, Bridgeport, Conn.
Diamond H. See Hart Mfg. Co.
Dunstic Electric Co., Kent, O.
General Electric Co., Section W-234, Merchandise Dept., Bridgeport, Conn.
Hart Mfg. Co., Hartford, Conn.
Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn.

SWITCHES, Storage Battery; Automatic Disconnecting

Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee.
Penn Electric Switch Co., Des Moines, Ia.
Radioloc. See Cutler-Hammer Mfg. Co.

SWITCHES, Tank

Anderson & Co., C. J., 212 W. Austin Ave., Chicago, Ill.
Blackburn-Smith Corp., 25 W. 45th, New York, N. Y.
Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee.
Electrical Repair Co., 240 W. 25th, New York, N. Y.

General Electric Co., Schenectady, N. Y.
Industrial Controller Div. of Square D Co., S. Pierce & Hanover Sts., Milwaukee, Wis.
Leader-Trabern Products Co., Decatur, Ill.
Ostrander Elec. Wks., W. R., 911 Atlantic Ave., Brooklyn.
Penn Elec. Switch Co., 20th & Walnut, Des Moines, Ia.
Sundh Elec. Co., 209 Parkhurst, Newark, N. J.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

SWITCHES, Time (Automatic Clock Operated Switches)

Anderson Mfg. Co., Albert & J. M., 289 A, Boston, Mass.
Astrachron. See Gem Engineering Co.
Automatic Elec. Heater Co., 1505 Race, Philadelphia, Pa.
Automatic Elec. Mfg. Co., Mankato, Minn.
Automatic Lighting Co., 231 Greenmount Ave., Baltimore.
Automatic Timer Co., 1841 Euclid Ave., Cleveland, O.
Berry, A. Hall, 73 Murray, New York, N. Y.
Brown & Pengilly, Inc., 1204 Folsom, San Francisco, Cal.
Buckeye Time Switches, Inc., 1557 St. Clair Ave., Cleveland, O.
Cackle. See Berry A. Hall.
Campbell Electric Mfg. Co., 15 Stewart, Lynn, Mass.
Clark. See Automatic Heater Co.
Con-tac-tor. See Absolute Con-tac-tor Corp.
Cramer & Co., R. W., 136 Liberty, New York, N. Y.
Electric Steam Radiator Co., 513 Stewart, Seattle, Wash.
Eureka Tool & Machine Co., 41 Walnut, Newark, N. J.
Frisch, Walter P., 104 Linden, Rochester, N. Y.
Gem Engineering Co., Hempstead, N. Y.
General Electric Co., Schenectady, N. Y.
Go-N-Set. See G. & S. Research Lab.
G. & S. Research Laboratory, 1269 Cochran Ave., Los Angeles, Cal.
Hart Mfg. Co., Hartford, Conn.
Hartford. See Berry A. Hall.
Horni Signal Mfg. Co., 290 Hudson, New York, N. Y.
Horolectrical Corp., 216 W. 14th, New York, N. Y.
Jewel. See Time Switch Sales & Service.
Knowles, W. E., 2889 Broadway, Oakland, Cal.
Kwixset. See Thompson Clock Co.
Lamp-Lighter. See Robbins & Myers Co.
Liberty Bell Mfg. Co., Minerva, Ohio.
Mercury Time Switch Co., Marine City, Mich.
Northwestern Clock Co., Omaha, Neb.
Ohio Time Switch Co., 1439 St. Clair Ave., Cleveland.
Paragon Elec. Co., 409 S. Dearborn, Chicago, Ill.
Racine. See Reliance Automatic Ltg. Co.
Radio Owl, 2269 E. 51st, Los Angeles, Cal.
Radio Switchman. See R-V Mfg. Co.
Reliance Automatic Ltg. Co., 1925 Meade, Racine, Wis.
Research Mfg. Laboratory, 1269 Cochran Ave., Los Angeles.
Robbins & Myers Co., Springfield, O.
Ross Safety Switch Corp., 1 E. 42nd, New York, N. Y.
R-V Mfg. Co., Marshfield, Mass.
Sauter. See Cramer & Co.
Sentinel. See Electric Steam Radiator Co.
States Co., Hartford, Conn.
Stromberg Electric Co., 223 W. Erie, Chicago, Ill.
Thompson Clock Co., H. C., Bristol, Conn.
Time Switch Sales & Service, 1841 Euclid Ave., Cleveland.
Tork Clocks, Inc., 12 E. 41st, New York, N. Y.
Walser Automatic Timer Co., 342 Madison Ave., New York.
Zenith Elec. Co., 337 S. Dearborn, Chicago, Ill.

TACHOMETERS

Speed Indicators, Speedometers, Revolution Counters.

Biddle, James G., 1209 Arch, Philadelphia, Pa.
Brown Instrument Co., Wayne & Windrim, Philadelphia.
Comet Elec. Co., 47 Union Trust Bldg., Indianapolis, Ind.
Durant Mfg. Co., 655 Buffum, Milwaukee, Wis.
Electric Tachometer Corp., Spring Garden & Broad St., Philadelphia, Pa.
Holtzer-Cabot Elec. Co., Boston, Mass.
Leeds & Northrup Co., 4901 Stenton Ave., Philadelphia, Pa.
Misener Mfg. Co., 326 E. Washington, Syracuse, N. Y.
Productimeter. See Durant Mfg. Co.
Standeo. See Sticht & Co.
Stairs Co., 10 New Park Ave., Hartford, Conn.
Sticht & Co., H. H., 13 Park Row, New York, N. Y.
Veeder Mfg. Co., 14 Sargeant, Hartford, Conn.
Weston Elect. Instrument Co., 582 Frelinghuysen Ave., Newark, N. J.
Zernickow Co., O., 15 Park Row, New York, N. Y.

TAGS, Cable; Pole and Battery

American Radio Hardware Co., 135 Grand, New York, N. Y. (Battery Lead Tags.)
Benedict Mfg. Co., East Syracuse, N. Y.
Brooklin Underground Elec'l Mfg. Co., Glenside, Pa.
Crowe Name Plate & Mfg. Co., 1749 Grace, Chicago, Ill.
Grammes & Sons, Inc., L. F., Allentown, Pa.
International Tag Co., 319 N. Whipple, Chicago, Ill.
Matthews & Co., Jas. H., 3942 Forbes, Pittsburgh, Pa.
Premax Products, Inc., 230 Tenth, Niagara Falls, N. Y.
Viking Tool & Machine Co., 745 65th, Brooklyn, N. Y.
Waterbury Button & Moulding Co. Waterbury, Conn.

TAGS, Shipping

Campbell Paper Box Co., South Bend, Ind.
International Tag Co., 319 W. Whipple, Chicago, Ill.

TAMPING TOOLS, COIL. See Tools, Commutator Truing.
TANK SWITCHES. See Switches, Tank.
TANKS, TINNING. See Wire Manufacturing Machines.

TANTALUM

Fansteel Products Co., Inc., North Chicago, Ill.

TAPE, Asbestos

American Asbestos Co., Norristown, Pa.
Asbestos Fibre Spinning Co., North Wales, Pa.
Ferodo & Asbestos, Inc., New Brunswick, N. J.
General Asbestos & Rubber Co., Charleston, S. C.
Johns-Manville Corp., New York N. Y.
Matthews & Co., Jas. H., 3942 Forbes, Pittsburgh, Pa.
Mitchell-Rand Mfg. Co., 19 Vesey, New York, N. Y.
Niagrite. See Johns-Manville, Inc.
Shield Brand. See Mitchell-Rand Mfg. Co.

TAPE, Cotton, Linen, Silk;

Tape, Sleeving, Webbing.

Alfalfa. See Burrell Belting Co.
Anchor Webbing Co., 300 Brook, Pawtucket, R. I. (Cotton, Silk).
Awabco. See Anchor Webbing Co.
Germaline. See Burrell Belting Co.
Burrell Belting Co., 413 S. Hermitage Ave., Chicago, Ill.
Eagle. See Sidebotham, Inc., John.
General Electric Co., Schenectady, N. Y.
Gilmer Co., L. H., Cottman & Keystone Sts. (Tacony), Philadelphia, Pa.
Hope Webbing Co., 1005 Main, Providence, R. I.
Krout & Fite Mfg. Co., Allegheny Ave. & Emerald Philadelphia, Pa.
Mitchell-Rand Mfg. Co., 19 Vesey, New York, N. Y.
Pearce Co., R. T., Covington, Ky.
Shield Brand. See Mitchell-Rand Mfg. Co.
Sidebotham, Inc., John, 4317 Griscom, Philadelphia, Pa.
Smith Belting Co. (Germantown), Philadelphia, Pa.
Superfine. See Windsor Webbing Co.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
Windsor Webbing Co., Pawtucket, R. I.
Worcester Braiding Co., 34 Southbridge, Worcester, Mass.

TAPE, Mica

Chicago Mica Co., 345 Campbell, Valparaiso, Ind.

Mica Insulator Co., 200 Varick, New York, N. Y.
Mica Mfg. Co., 135 Johnson, Brooklyn, N. Y.
Mitchell-Rand Mfg. Co., 19 Vesey, New York, N. Y.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

TAPE, Rubber and Friction

Ackerman. See Ackurate Rubber Co.
Ackurate Rubber Co., 25 Beaver St., New York, N. Y.
Adamson & Co., Joseph, Columbia and Germantown Aves., Philadelphia, Pa.
Adhere. See Westinghouse Elec. & Mfg. Co.
Alpha. See Johns-Manville, Inc.
Amazon. See Graybar Elec. Co.
Appleton Rubber Co., Franklin, Mass.
Black Diamond. See Dunton Co., M. W.
Boston Woven Hose & Rubber Co., Boston, Mass.
Brooklyn. See Johns-Manville, Inc.
Bull-Dog. See Boston Woven Hose & Rubber Co.
Candee. See Ackurate Rubber Co.
Canfield Rubber Co., Bridgeport, Conn.
Canton. See Plymouth Rubber Co.
Clifton. See Clifton Mfg. Co.
Clifton Mfg. Co., 65 Brookside Ave., Boston 30, Mass.
Competition. See New York Insulated Wire Co.
Double-Wear. See Dryden Rubber Co.
Dryden Rubber Co., 1014 S. Kildare Ave., Chicago, Ill.
Dundee, A. & B. See Okonite Co.
Dunton Co., M. W., 670 Eddy St., Providence, R. I.
Dutch-Brand. See Van Cleef Bros.
Elkhart Rubber Wks., Elkhart, Ind.
Firestone Tire & Rubber Co., Akron, O.
General Electric Co., Merchandise Dept., Bridgeport, Conn.
Graybar Elec. Co., Graybar Bldg., Lexington Ave. & 43rd St., New York, N. Y.
Grimshaw. See New York Insulated Wire Co.
Griptite. See Canfield Rubber Co.
Holfast Rubber Co., Atlanta, Ga.
Hoidtite. See United States Rubber Co.
Hydro-Proof. See Elkhart Rubber Wks.
Imperial Rubber Co., 220 Broadway, New York N. Y.
Impervo. See Canfield Rubber Co.
Ireo. See Imperial Rubber Co.
Johnson & Johnson, New Brunswick, N. J.
Jonns-Manville Corp., New York, N. Y.
Jomanco. See Johns-Manville, Inc.
Jonflex. See Johnson & Johnson.
Kerite Ins. Wire & Cable Co., 30 Church, New York, N. Y.
Manson. See Okonite Co.
Mitchell-Rand Mfg. Co., 19 Vesey, New York, N. Y.
New York Insulated Wire Co., 114 Liberty, New York, N. Y.
Okonite Co., Passaic, N. J.
O. K. See Appleton Rubber Co.
P. & B. See Ruberoid Co.
Paratex. See Appleton Rubber Co.
Paruco. See Passaic Rubber Co.
Passaic Rubber Co., Clifton, N. J.
Plymouth Rubber Co., 1400 Revere, Canton, Mass.
Red-X. St. Louis Rubber Cement Co.
Relio. See United States Rubber Co.
Ruberoid Co., 95 Madison Ave., New York, N. Y.
S. I. See Superior Insulating Tape Co.
Sitco. See Superior Insulation Tape Co.
Slipknot. See Plymouth Rubber Co.
Star. See Sullivan & Sons Mfg. Co., J.
Sticks. See Graybar Elec. Co.
Stixwell. See Clifton Mfg. Co.
Sullivan & Sons Mfg. Co., J., 2224 N. 9th, Philadelphia, Pa.
Superior Insulating Tape Co., 3044 Lambdin Ave., St. Louis.
2-Plex. See Holfast Rubber Co.
U. S. See United States Rubber Co.
United States Rubber Co., 1790 Broadway, New York, N. Y.
Vans. See United States Rubber Co.
Van Cleef Bros., 7722 Woodlawn Ave., Chicago.
Victor. See Graybar Elec. Co.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

TAPE, Varnished Fabric

Acme Wire Co., New Haven, Conn.
General Electric Co., Merchandise Dept., Bridgeport, Conn.
Irvington Varnish & Insulator Co., Irvington, N. J.
Irv-O-Flatseme. See Irvington Varnish & Insulator Co.
Mica Insulator Co., 200 Varick, New York, N. Y.
Mitchell-Rand Mfg. Co., 19 Vesey, New York, N. Y.
New Jersey Wood Finishing Co., Woodbridge, N. J.
Radiotape. See Respro, Inc.
Respro, Inc., Wellington Ave. (Auburn), Providence, R. I.
Shield Brand. See Mitchell-Rand Mfg. Co.
Sico. See Standard Insulator Co.
Standard Insulation Co., East Rutherford, N. J.
Voltape. See Respro, Inc.

TAPING MACHINES, Coil

Chapman Electric Works, P. E., 1820 Chouteau Ave., St Louis, Mo.
Columbia Machine Works & Malleable Iron Co., Atlantic Ave. and Chestnut St., Brooklyn, N. Y.
Electric Service Supplies Co., 17th & Cambria Sts., Philadelphia, Pa.
Griswold Machine Co., George, New Haven, Conn.
Ridlon Company, Frank, Boston, Mass.
Secur. See Electric Service Supplies Co.
Seifert, E. R., 315 E. Washington, Syracuse, N. Y. (Automatic.)

TAPING MACHINES, Wire

American Insulating Machinery Co., 519 Huntington Ave., Philadelphia, Pa.
Wire Machinery Corp. of Am., New Haven, Conn.

TAPS. See Stocks, Dies and Reamers.
TENSION DEVICES, Coil Wire. See Racks, Wire Reel

TENSION MACHINES, Band Wire

Electric Service Supplies Co., 17th & Cambria Sts., Philadelphia, Pa.
Peerless. See Electric Service Supplies Co.

TERMINALS AND CONNECTORS

Low Tension, Secondary Terminals and Connectors.

All-in-One. See Ohio Parts Co.
Barry-Nicholson Co., 2351 Fort, W., Detroit, Mich.
Bassett Metal Goods Co., Derby, Conn. (General Selling Agent, Hatheway & Co., 16 Hudson, New York, N. Y.)
Burton-Rogers Co., Boston, Mass.
Cabelug. See Jones, Howard B.
Clark Metal Products, 490 Hancock Ave., Bridgeport.
Dixie Supply Co., 91 7th Ave., New York.
Double Grip. See Pons, Eugene
Eagle Elec. Mfg. Co., 59 Hall, Brooklyn, N. Y.
Electrose. See Bassett Metal Goods Co.
Fahnestock Elec. Co., East Ave. and 8th, Long Island City, N. Y.
Grammes & Sons, Inc., L. F., Allentown, Pa.
Ideal Clamp Mfg. Co., 198 Bradford, Brooklyn, N. Y.
Jones, Howard B., 2256 Wabansia, Chicago, Ill.
K. E. M. See Kuller Elec. Mfg. Co.
Kuller Elec. Mfg. Co., 575 Pierce Ave., Long Island City
Morse Co., Frank W., Boston, Mass.
Nu-Way Snap. See Hatheway Mfg. Co.
Ohio Parts Co., 3391 Colerain Ave., Cincinnati, O.
Orum, S. R. M., 503 N. 11th, Philadelphia, Pa.
Patton-MacGuyer Co., Providence, R. I.
Pons, Eugene, 927 Campbell Ave., Schenectady, N. Y.
Petersen Co., 7 Beverly, Providence, R. I.
Rajah Co., Bloomfield, N. J.

ALUMINUM

FAIRMONT specializes in aluminum and aluminum-alloy sheet, rolling all commercial grades, sizes and tempers; or, if some electrical manufacturer wants sand or permanent-mold aluminum castings, he couldn't come to a better place than FAIRMONT.

All we need is a "fair break" on that next order—we can meet any condition of price and we certainly won't slip up on the delivery end of the bargain.

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Warehouse Distributors
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Sueske Brass & Copper Co., Chicago
Chas. A. Sterlinger Co., Detroit
J. M. & L. A. Osborn Co., Cleveland
Ducommum Corporation, Los Angeles and San Francisco

A new commutator in 7 hours instead of 2 weeks

One Friday morning, a few weeks ago, a lad from New York walked into our plant with a commutator shell that had two badly worn segments. He informed us that his boss had ordered him to *wait for a new commutator.*

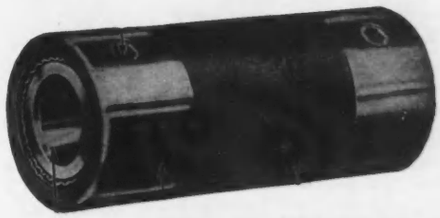
Always carrying in stock at least 100,000 pounds of harddrawn copper bar in 1,200 different sizes, we "went to it" and in 7 hours that lad was on his way back with a new commutator.

If we had not been prepared, it would have required two weeks to make delivery. This fact together with over a quarter-century experience in making *good commutators* is the reason why so many prominent electrical manufacturers are *on* our books as *regular* customers.

The Cameron Electrical Mfg. Co., Ansonia, Conn.

CAMERON
COMMUTATORS

The link that's *missing* in a worn-out washer



ONEIDA FLEXIBLE COUPLING

It's "dollars to doughnuts"—if an *Oneida Flexible Coupling* had been used as the connecting link between motor and mechanism, that washer would have survived years more of service.

The Oneida isn't an expensive "gadget" but one of the most essential factors in the life of a washer and its motor.

Let us send you a sample.

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1. Air Heaters
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5. Laboratory Resistors and Rheostats.
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7. Radio Resistors and Rheostats.
8. Resistors for all purposes.
9. Rheostats for all purposes.
10. Speed Controllers.
11. Theatre Dimmers.

WARD LEONARD ELECTRIC CO.
31-41 South St. Mount Vernon, N. Y.

TERMINALS & CONNECTORS—Continued
Salem Elec'l Supply Co., Salem, Mass.
Sherman Mfg. Co., H. B., Battle Creek, Mich.
Shure. See Burton-Rogers Co.
Tinkerbox. See Weber Elec. Wks.
Waterbury Button & Moulding Co., Waterbury, Conn.
Weber Elec. Wks., Brooklyn Sta., Cleveland, O.
Wolverine Tube Co., 1431 Central Ave., Detroit, Mich.
Zierick Machine Wks., F. R., 6 Howard, New York.

TERMINAL BLOCKS
Penn Union Elec. Corp., Erie, Pa.

TEST BENCHES, Armature
Allen Electric & Equipment Co., Kalamazoo, Michigan.
Burton & Rogers Co., Boston, Mass.
Cowie Electric Co., E. S., 1816 McGee, Kansas City, Mo.
Hobart Bros. Co., Troy, Ohio.
Marshall Elec. Co., Elkhart, Ind.
Mihe Company, 717 Sycamore, Cincinnati, Ohio.
North East Appliance Corp., Rochester, N. Y.
Ponce & Son, H. O., San Luis Obispo, Cal.
Weidenhoff, Joseph, 4352 W. Roosevelt Road, Chicago, Ill.

TESTING INSTRUMENTS. See Instruments.

TESTERS, Coil
(Includes Armature Growlers, trouble shooters, and other portable testing devices). See also Instruments
Ace. See Weidenhoff, Joseph.
Allen-Bradley Co., 494 Reed, Milwaukee, Wis.
Allen Electric & Equipment Co., Kalamazoo, Michigan.
Ankenbrandt, J. J., 2140 Wakeman, Toledo, Ohio.
Armeter. See Chapman Electric Works, P. E.
Bartlett Electric Products Co., Goshen, Ind. (Storage Battery).
Batt-O-Meter. See Indiana Mfg. & Elec. Co., also Case Elec.
Burton & Rogers Co., 857 Boylston, Boston, Mass.
Case Elec Co., Marion, Ind.
Century Electrical Co., 100 Randall Ave., Syracuse, N. Y.
Chapman Elec'l Works, P. E., 1820 Chouteau Ave., St. Louis, Mo.
Cleveland Steel Products Corp., 7306 Madison Ave., Cleveland, O.
Colpin Corp., 6110 S. Main, Los Angeles, Cal.
Columbia. See Weidenhoff, Joseph.
Comparometer Co., New Ulm, Minn.
Cowie Electric Co., E. S., 1816 McGee, Kansas City, Mo.
Economy. See Weidenhoff, Joseph.
Electric Controller & Mfg. Co., 2700 E. 79th, Cleveland.
Electrotest. See Comparometer Company.
Ev-Ri-Test. See Weidenhoff, Joseph.
Ga-Jit. See General Instrument Corp.
General Instrument Corp., 225 Varick, New York, N. Y.
Herald Elec. Co., 29 East End Ave., New York, N. Y.
Hobart Bros. Co., Troy, Ohio.
Ideal. See Ankenbrandt, J. J.
Indiana Mfg. & Electric Co., Marion, Indiana.
Kietzman Electrical Mfg. Co., 234 N. Central, Gilman, Ill.
Leich Electric Co., Genoa, Ill.
Lundin Electric Machine Co., 10 Thacher, Boston, Mass.
Mallory Electric Co., Factories Bldg., Toledo, Ohio.
Marshall Elec. Co., Elkhart, Ind.
Mihe Company, 717 Sycamore, Cincinnati, Ohio.
North East Appliance Corp., Rochester, N. Y.
Onan, David W., 43 Royalstone Ave., Minneapolis, Minn.
Paneltest. See Allen Elec. & Equip. Co.
Portometer. See Allen Elec. & Equip. Co.
Portostat. See Allen Elec. & Equip. Co.
Presto. See Metal Specialties Mfg. Co.
Rex Batrystat. See Bartlett Products Co.
Scout. See Leich Electric Company.
States Co., 19 New Park Ave., Hartford, Conn. (Transformer Test Table)
Test-All. See Colpin Corp.
Test-O-Meter. See Weidenhoff, Joseph.
Test-Rite. See Colpin Corp.
Victory. See Weidenhoff, Joseph.
Weidenhoff, Joseph, 4352 W. Roosevelt Rd., Chicago, Ill.

TESTING LABORATORIES
Baker & Co., Inc., 54 Austin, Newark, N. J.
Elec'l Testing Laboratories, 80th St. and East End Ave., New York, N. Y.
National Elec'l Inst. Co., 162 Sidney, Cambridge, Mass.
New York Testing Laboratories, 80 Washington, New York.
Rubicon Co., 29 N. Sixth, Philadelphia, Pa.

THERMO JUNCTIONS. See Instruments, Laboratory Standard.

THERMOSTATIC METAL
Baker & Co., Inc., 54 Austin, Newark, N. J.
Chace Valve Co., W. M., 1608 Beard Ave., Detroit, Mich.
Coffin Mfg. Co., B. F., 30 Court, Newark, N. J.
Cook Plate Co., Edw. N., 70 Ship, Providence, R. I.
General Plate Co., Attleboro, Mass.
Improved Seamless Wire Co., 775 Eddy, Providence, R. I.
Interstate Products Corp., 503 Mulberry, Newark, N. J.
National-Harris Wire Co., 195 Verona Ave., Newark, N. J.
Venbur. See Coffin Mfg. Co., B. F.
Wilco. See H. A. Wilson Co.
Wilson Co., H. A., Newark, N. J.

THERMOSTATS
American Thermostat Co., 226 Jeliff Ave., Newark, N. J.
Automatic Appliance Co., Jackson, Mich.

THERMOSTATIC METAL
For Low and High Temperatures
Our No. 1800 metal for temperatures up to 450° F.
Our No. 2800 metal for temperatures up to 1500° F.
W. M. CHACE VALVE COMPANY
1600 Beard Avenue. Detroit. Mich.

Bak-Rite. See Electric Appliance Mfg. Co.
Bisnop & Babcock Sales Co., 4901 Hamilton Ave., N. E., Cleveland, O.
Boston Machine Wks. Co., 7 Willow, Lynn, Mass.
Brown. See Electric Automatic Appliance Co.
Brown Instrument Co., Wayne & Windrim, Philadelphia, Pa.
Burke Controller Co., 369 Lexington Ave., New York, N. Y.
Cobb Elec. Appliance Co., 100 Massachusetts Ave., Boston.
Cramblett Engineering Div. of Time-O-Stat Controls Co., 286 Milwaukee, Milwaukee, Wis.
Coffin Mfg. Co., B. F., 30 Court, Newark, N. J.
Diamond E. See Hart Mfg. Co.
Dunco. See Struthers Dunn, Inc.
Electric Automatic Appliance Co., Denver, Colo.
Electric Heat Control Co., 2902 Carnegie Ave., Cleveland, O.
Electric Maid. See Hankscraft Co.
Fabrice Thermostatic Control Co., 4750 Sheridan Rd. Chicago, Ill.
Frass Thermo-Electric Co., 1206 S. Grove, Irvington, N. J.
Globe Mfg. Co., Battle Creek, Mich.
Hankscraft Co., 615 E. Washington, Madison, Wis.
Hart Mfg. Co., Hartford, Conn.
Hi-Lo. See Boston Machine Wks. Co.
Hynes & Cox Elec. Corp., 406 N. Pearl, Albany, N. Y.
Interstate Products Corp., 29 Commercial, Newark, N. J.
King. See Electric Heat Control Co.
Klixon. See Westinghouse Electric & Mfg. Co.
Manhattan Elect. Supply Co., 510 Sixth Ave., New York.
Marvel. See American Thermostat Co.
Mercoid Corp., 564 W. Adams, Chicago, Ill.
Moeller, A. E., 261 Sumpter, Brooklyn, N. Y.
Midget. See Coffin Mfg. Co., B. F.
National Steel Construction Co., 425 Fountenac, Seattle, Wash.
Pyratherm. See Federal Gauge Co.
Safety Regulator Co., 529 S. Mathews, Los Angeles, Cal.
Sayutine Devices, Inc., 88 Manhattan, Rochester, N. Y.
Struthers Dunn, Inc., 138 N. Juniper, Philadelphia, Pa.
Tagliabue Mfg. Co., C. J., 18 33rd, Brooklyn, N. Y.
Teeple Co., L. R., 540 E. 9th, Portland, Ore.
Thermoelectric. See Bishop & Babcock Sales Co.
Time-O-Stat Controls Co., Elkhart, Ind.
Trent Co., Harold E., 439 N. 12th, Philadelphia, Pa.
Visaflame. See Mercoid Corp.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
Wilcolator Co., Newark, N. J.

TIGHTENERS, Commutator
Elmes Engineering Works, Chas. F., 230 N. Morgan, Chicago, Ill.

TIME SWITCHES. See Switches, Time.

TIN FOIL
Lehmaier, Schwartz & Co., 521 W. 25th, New York, N. Y.
United States Foil Co., 30th & Grand Sts., Louisville, Ky.

TINNING TANKS, WIRE. See Wire Manufacturing Machines.

TINSEL. See Wire, Insulated.

TINSEL, Cord and Thread
Belden Mfg. Co., 4633 W. Van Buren, Chicago, Ill.
Diamond Braiding Mills, Chicago Heights, Chicago, Ill.
Empire Notion Co., 335 W. 35th, New York, N. Y.
Frank & Co., M. J., 15 W. 39th St., New York, N. Y.
General Electric Co., Merchandise Dept., Bridgeport, Conn.
Hy-Sil Mfg. Co., Revere, Mass.
Kilo Co., 2 E. 23rd, New York, N. Y.
Koelle, Frederick C., Real Estate Trust Bldg., Philadelphia.
Lees Mfg. Co., 320 Broadway, New York, N. Y.
Montgomery & Co., J. R., Windsor Locks, Conn.
Rockbestos Products Corp., 369 Nicoll, New Haven, Conn.
Springfield Wire & Tinsel Co., Springfield, Mass.
Taft Co., R. C., 174 N. Franklin, Chicago, Ill.

TIPS, Cord
Duro. See McEvoy, C. H.
McEvoy, C. H., 430 Broadway, Lowell, Mass.
National Acme Mfg. Co., 7500 Stanton Ave., Cleveland, O.
Norden & Co., S. 180 S. Water, Providence, R. I.
Rome Wire Co., Div. of General Cable Corp., Rome, N. Y.
Waterbury Brass Goods Corp., Waterbury, Conn.

TOOLS, Commutator Slotting. See Slotting Machines & Tools, Commutator.

TOOLS, Coil Tamping
Ideal Commutator Dresser Co., 1039 Park Ave., Sycamore, Ill.

TOOLS, Commutator Truing
Acme. See Green Equipment Corp.
Allen Elec. & Equipment Co., N. Pitcher St., Kalamazoo, Mich.
Binghamton Flexible Shaft Co., Binghamton, N. Y.
Central Mfg. Co., Fairfield, Ia.
Green Equipment Corp., Monadnock Block, Chicago, Ill.
Ideal Commutator Dresser Co., 1039 Park Ave., Sycamore, Ill.
Imperial. See Martindale Elec. Co.
Jordan Bros., 74 Beekman, New York, N. Y.
Martindale Elec. Co., 1267 W. Fourth, Cleveland, Ohio.

TOOLS, Storage Battery
Battery Equipment & Supply Co., 7530 Greenwood Ave., Chicago, Ill. Burning Racks, Battery Trucks, Plate Pressers, Mallets, Lead Burners and Strainers.
Battery Parts Co., Inc., Wilkinsburg, Pa. (Leads.)
Battery Tools Co., 29 Willow, Montclair, N. J.
Besco. See Battery Equipment & Supply Co.
Bobbett Elec. Mfg. Co., 811 E. 43rd St., Chicago, Ill. (Knife Heaters.)
Canedy-Otto Mfg. Co., 1816 McGee, Chicago Heights, Ill. (Floor Vises.)
Cleveland Steel Products Corp., 7306 Madison Ave., Cleveland, O. (Steamer and Still, Filler, Separator Cutter, Clips, Carrier, Post Cutter, Terminal and Cell Puller.)
General Elec. Co., Schenectady. (Lead Burning Outfits.)
Heet-A-Knife. See Op-al Elec. & Mfg. Co.
Ohio Parts Co., 3301 Colerain Ave., Cincinnati. (Terminals.)
Op-al Elec. & Mfg. Co., 1057 E. 30th St., Indianapolis, Ind. (Knife Heaters.)
Orum, S. R. M., 503 N. 11th, Philadelphia, Pa. (Pillar Post Sleeves, Tongs, Reamers, Strap Punches, Terminal Pullers, Steamers, Racks or Stands, Terminal Post Shapers, Battery Analyzer, Post Sealing Machine, Plate Burning Press, Press and Stands.)
Pyratip. See General Elec. Co.
Thompson Mfg. Co., Meadville, Pa. (Reamers, Terminal Post Pullers, Pressing Tongs.)

TORCHES AND FURNACES
Acetylene, Alcohol, Gasoline, Kerosene.
Berns Co., Otto, Newark, N. J.
Clayton & Lambert Mfg. Co., Detroit, Mich.
Dreadnaught. See Wall Mfg. Supply Co.
Klein & Sons, Mathias, Chicago, Ill.
Lasher-Weeber Co., 261 Franklin, Boston, Mass.
McGill Mfg. Co., Valparaiso, Ind.
Stayzalite. See Klein & Sons, Mathias.

TORPEDO Cord. See Twine.

TORSION BALANCES. See Instruments, Laboratory Standard.

TRANSFORMERS
Radio. See Radio Circuit Components.
Gas Tube Sign. See Transformers, Oil Burner.

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A how-to-do-it article describing the Quality Club at the Indianapolis plant of Fairbanks, Morse & Company begins on Page 49. Undoubtedly the cooperative methods followed by this concern for bettering quality of output will work for you, too.

Oil Burner Ignition. See Transformers, Low & Intermediate Voltage.

TRANSFORMERS, Low and Intermediate Voltage
For Oil Burners, Gas Tube Signs, and other special purposes.
American Bosch Magneto Corp., Springfield, Mass.
American Transformer Co., Newark, N. J.
Campbell Elec. Mfg. Co., Lynn, Mass.
Concourse Electric Co., 294 E. 137th, New York, N. Y.
Dongan Elec. Mfg. Co., 2985 Franklin, Detroit, Mich.
General Electric Co. (Merchandise Dept.), Bridgeport, Conn.
Jefferson Electric Co., 1500 S. LaSalle, Chicago, Ill.
K-W Ignition Corp., 2811 Chester Ave., Cleveland, Ohio.
Manhattan Elect. Supply Co., 510 Sixth Ave., New York.
Power Transformer Co., 145 W. 22nd, New York, N. Y.
Sergel Electric Co., 89 W. Water, Milwaukee, Wis.
Standard Transformer Co., Warren, O.
Uptigraff Mfg. Co., R. E., First National Bank Bldg., Pittsburgh, Pa.
Ward Leonard Elec. Co., Mt. Vernon, N. Y.
Webster Electric Co., Racine, Wis.

TRANSMISSION DRIVES. See Chain, Transmission.

TRANSMITTERS, Power
Controller drive giving a variety of speeds for use in connection with coil taping machines.
Electric Service Supplies Co., 17th & Cambria Sts., Philadelphia, Pa.
Segur. See Electric Service Supplies Co.

TROUBLE FINDERS. See Instruments, Portable and Switchboard; also Testers, Coil.

TRUCKS, Armature. See Lifts, Armature.

TRUCKS, Factory Steel
Angle Steel Stool Co., Plainwell, Mich.

TRUING Devices, Commutator. See Tools, Commutator.

TUBE (Tubes) (Tubing) Adapters. See Radio Receiver Parts.
Aluminum. See Aluminum.
Brass. See Tubing, Brass.
Condenser. See Tubing, Brass and Copper.
Copper. See Tubing, Brass.
Cutters. See Stocks, Dies, etc.
Fibre. See Fibre.
Fibre Candle. See Candles.
Mica. See Mica.
Nickel. See Tubing, Brass & Copper.
Paper. See Tubes, Paper.
Platinum. See Platinum.
Porcelain. See Porcelain.
Pyrometer. See Cores, Resistance.
Refractory. See Cores, Resistance.
Radio. See Radio Vacuum Tubes.
Varnished Fabric. See Tubing, Varnished Fabric.

TUBES, Paper; Cores; Sleeves, Bushings
Cleveland Container Co., 10619 Berea Rd., Cleveland, O.
Climax Tube Co., Mystic, Conn.
Klimaxcore. See Climax Tube Co.
McCausland, J. E., 86 Valley, Providence, R. I.
Fairpoint Corp., New Bedford, Mass.
Paper Tube Co., 1718 N. Damen Ave., Chicago, Ill.
Reliable Elec. Co., 3145 Carroll Ave., Chicago, Ill.
Remington Mfg. Co., 839 Barnum Ave., Bridgeport, Conn.
Standard Underground Cable Co., Div. of General Cable Corp., Pittsburgh, Pa.
Stone Paper Tube Co., Washington, D. C.
Textile Tube Co., Fall River, Mass. (Paper Sleeves.)

TUBING, Brass and Copper
American Brass Co., Waterbury, Conn.
Anaconda. See American Brass Co.
Baltimore Tube Co., 1301 Wicomico, Baltimore, Md.
Bridgeport Brass Co., Bridgeport, Conn.
Bull Dog. See National Elec. Products Corp.
Chase Brass & Copper Co., Waterbury, Conn.
Conklin Brass & Copper Co., T. E., 54 Lafayette, New York.
Cook, Dunbar Smith Co., 85 Sprague, Providence, R. I.
Dallas Brass & Copper Co., Div. of Revere Copper & Brass, Inc., 820 Orleans, Chicago, Ill.
French Mfg. Co., 128 Robbins, Waterbury, Conn.
Michigan Copper & Brass Co., Div. of Revere Copper & Brass, 5851 Jefferson Ave., Detroit, Mich.
Mueller Brass Co., Port Huron, Mich.
National Copper & Smelting Co., 1395 Coltman Rd., Cleveland, O.
National Elec. Products Corp., Pittsburgh, Pa.
Relleum. See Mueller Brass Co.
Roberts Tube Works, 2500 Military Ave., Detroit, Mich.
Rome Brass & Copper Co., Rome, N. Y.
Rome Hollow Wire & Tube Co., Div. of Revere Copper & Brass, Inc., Rome, N. Y.
Rome Turney Radiator Co., Rome, N. Y.
Scovill Mfg. Co., Waterbury, Conn.
Standard Underground Cable Co. (Div. of General Cable Corp.), Pittsburgh, Pa.
Summerill Tubing Co., Bridgeport, Pa. (also Nickel)
Torrington Mfg. Co., Torrington, Conn.
United Wire & Supply Co., 1497 Elmwood Ave., Providence.
Wells Co., A. H., Watertown Ave., Waterbury, Conn.
Wolverine Tube Co., 1431 Central Ave., Detroit, Mich.

TUBING, Flexible Metallic
(Flexible Tubing.)
Almond Mfg. Co., T. R., Ashburnham, Mass.
American Metal Hose Co., Waterbury, Conn.
American Metal Moulding Co., 146 Colt St., Irvington, N. J.

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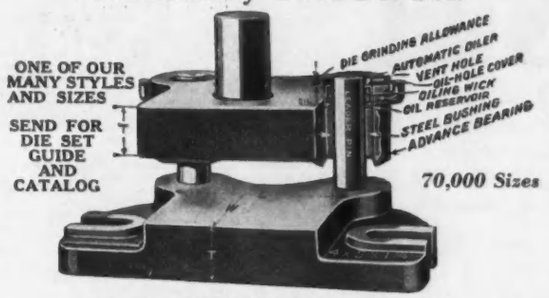

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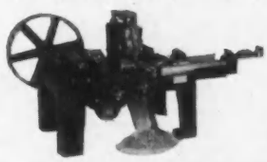

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Auto-Steelflex. See National Metal Elec. Products Corp.
Breese Corp., Inc., 24 S. 6th, Newark, N. J.
Fischer Spring Co., Chas., 238 Kent Ave., Brooklyn, N. Y.
Flexo Spring Mfg. Inc., 34 South First, Brooklyn, N. Y.
National Elec. Products Corp., 1110 Fulton Bldg., Pittsburgh, Pa.
Riflex. See United Metal Hose Co.
Sleeper & Hartley, Inc., Worcester, Mass.
Time-O-Stat Controls Co., Elkhart, Ind.
Titeflex Metal Hose Co., Newark, N. J.
Triangle Conduit Co., Dry Harbor Rd. and Cooper Ave., Brooklyn, N. Y.
United Metal Hose Co., 724 Garrison Ave., New York, N. Y.
White Dental Mfg. Co., S. S., 152 W. 42nd, New York.

TUBING, Rubber
Rubber Tubing for Insulating Wire in Instruments and Telegraph Signal Lines.
Canfield Rubber Co., 702 Railroad Ave., Bridgeport, Conn.
Eisler Electric Corp., 756 S. 13th, Newark, N. J.
Faultless Rubber Co., Ashland, O.
Forest City Rubber Co., 1276 Ontario, Cleveland, O.
Goodrich Rubber Co., B. F., Akron, O.
Rubber-Vac. See Eisler Electric Corp.
Tyler Rubber Co., Andover, Mass.
Vulcanized Rubber Co., 251 Fourth Ave., New York, N. Y.

TUBING, Varnished Fabric
Insulating Tubing—Spaghetti.
Acme Wire Co., New Haven, Conn.
Alpha Wire Corp., 520 Broadway, New York, N. Y.
Bentley-Harris Mfg. Co., Conshohocken, Pa.
Brand & Co., William, 268 Fourth Ave., New York, N. Y.
Empire. See Mica Insulator Co.
General Electric Co., Merchandise Dept., Bridgeport, Conn.
Goodrich Rubber Co., B. F., Akron, O.
Insulated Duct & Cable Co., Stokes, Trenton, N. J.
Insulite Corp. of America, 78 Cortlandt, New York, N. Y.
Irvington Varnish & Insulator Co., Irvington, N. J.
Lee Tire & Rubber Co., Conshohocken, Pa.
Mica Insulator Co., 200 Varick, New York, N. Y.
Mitchell-Rand Mfg. Co., 19 Vesey, New York, N. Y.
Pearce Co., R. T., Covington, Ky. (Insulated Waxed Cotton.)
Turbo. See Brand & Co.
Varflex Corp., Rome, N. Y.

TURNED-UP BOXES AND CABINETS. See Cabinets, Sheet Steel.

TURNING TOOLS, COMMUTATOR. See Tools, Commutator Truing.

TWINE, Armature Winding; Torpedo Cord
Mitchell-Rand Mfg. Co., 19 Vesey, New York, N. Y.
Winne & Son, Frank W., 42 N. Front, Philadelphia, Pa.

UNDERCUTTERS, Mica. See Slotting Machines & Tools Commutator.

UNITS, Refrigerator Condenser. See Condenser Units, Refrigerator.

UNITS, Rods and Grids, Resistance
Acme Elec. Heating Co., Dept. R, 1217 Washington, Boston.
Allen-Bradley Co., 494 Reed, Milwaukee, Wis.
Automatic Electric Heater Co., 1706 Race, Philadelphia, Pa.
Bradleyunit. See Allen Bradley Co.
Buffalo Products Co., Broome & Lafayette Sts., New York.
Burger, J. P., 1813 Columbus Rd., Cleveland, O.
Calrod. See Edison General Elec. Appliance Co., Inc.
Chromalox. See Edwin L. Wiegand Co.
Clark Controller Co., 1146 E. 152nd, Cleveland, O.
Crown Coloring & Chemical Co., 33 W. 17th, New York.
Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee.
Dalton Elec. Heating Co., 287 Bridge St., Salem, Mass.
Dalton-Marsh Co., 88 Holten, Danvers, Mass.
Daric Co., 35 E. 21st, New York, N. Y.
Di-El-Ite. See Wirt Co.
Dixon Crucible Co., Jos., Jersey City, N. J.
Dur-rister. See Cutler-Hammer, Inc.
Eagle Elec. Mfg. Co., 79 Hall, Brooklyn, N. Y.
Edgerest. See Industrial Controller Div.
Edgewound. See Monitor Controller Co.
Edison General Electric Appliance Co., Inc., 5600 W. Taylor, Chicago, Ill.
Elec. Controller & Mfg. Co., 2700 E. 79th, Cleveland, O.
Electro Thermal-Unit Co., 44 N. Fourth, Philadelphia, Pa.
Elemite. See Louthan Mfg. Co.
Erie Resistor Corp., 644 W. Twelfth, Erie, Pa.
Fits-All. See Eagle Elec. Mfg. Co.
Fitz-All. See Rodale Mfg. Co.
Fitz-Rite. See Rodale Mfg. Co.
Fix-All. See Witlow Elec. Mfg. Co.
F & M. See Hiram Marks Elec. Co.
General Electric Co., Schenectady, N. Y.
Globar Corp., Niagara Falls, N. Y.
Glo-Well. See Eagle Elec. Mfg. Co.
Gold Seal Elecl. Co. of Ohio, Inc., 250 Park Ave., New York, N. Y.
Hance-Parker Mfg. Co., 397 West Main, Meriden, Conn.
Hankscraft Co., 615 E. Washington, Madison, Wis. (Oven Heater Unit.)
Hardwick, Hindle, Inc., 215 Emmett, Newark, N. J.
Hexwound. See Monitor Controller Co.
Industrial Controller Div. of Square D Co., S. Pierce & Hanover Sts., Milwaukee, Wis.
Industrial Heater Co., 300 Canal, New York, N. Y.
International Resistance Co., 2006 Chestnut, Philadelphia, Pa. (Radio Resistance.)
Kriscker's Mfg. Co., 255 Calyer, Brooklyn.
Louis Mfg. Co., 245 N. J. R. R. Ave., Newark, N. J.
Louthan Mfg. Co., East Liverpool, O.
Marks Elec. Co., Hiram, 304 Woodward Ave., Detroit, Mich.
Micamold Radio Corp., 1087 Flushing Ave., Brooklyn, N. Y.
Monitor Edgewound. See Clark Controller Co.
Monitor Controller Co., 51 S. Gay, Baltimore, Md.
Nelco. See Nelson Electric Co.
Nelson Electric Co., Plant City, Fla.
Northern Electric Co., 2433 N. Western Ave., Chicago, Ill.
Ogden Mfg. Co., 3947 Armitage Ave., Chicago, Ill.
Ohmite Mfg. Co., 633 N. Albany Ave., Chicago, Ill.
Ohm-Spun. See States Co.
Op-al Elec. & Mfg. Co., 1057 W. 30th, Indianapolis, Ind.
Parker & Co., J. C., 407 Bulletin Bldg., Philadelphia, Pa.
Poloron Elec. Mfg. Corp., 26 Waverly Pl., New York, N. Y.
Presto Products Co., 520 Broadway, New York, N. Y.
Prometheus Elec. Corp., 359 W. 13th, New York, N. Y.
Pyrox. See Westinghouse Elec. & Mfg. Co.
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Remco. See Reben Elec. Mfg. Co.
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Smoothwound. See Monitor Controller Co.
Snoco. See Snow & Co.
Snow & Co., E. W., Rochester, N. Y.
Stupakoff Laboratories, 6427 Hamilton Ave., Pittsburgh, Pa.
Super. See Northern Elec. Co.
Superior Resistor Corp., 334 Badger Ave., Newark, N. J. (Radio)
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Waage Elec. Co., 5100 W. Ravenswood Ave., Chicago.
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Warren Elec. Appliance Co., Warren, Pa.
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Westinghouse Elec. & Mfg. Co., Mansfield, O.
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Wiegand Co., Edwin L., 7530 Thomas Blvd., Pittsburgh, Pa.
Wirt Co., 5221 Greene, Philadelphia, Pa.

VACUUM CLEANER BAGS. See Bags, Vacuum Cleaner.

VACUUM DRYING & IMPREGNATING OVENS. See Ovens, Industrial.

VACUUM PUMPS. See Pumps, Vacuum.

VALVES, Electrically Operated
Anderson & Co., C. J., 212 W. Austin Ave., Chicago, Ill.
Asco. See Automatic Switch Co.
Automatic Switch Co., 154 Grand, New York.
Chapman Valve Mfg. Co., Indian Orchard, Mass.
Crane Co., 836 Michigan Ave., S., Chicago, Ill.
Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee
Electric Steam Radiator Co., 513 Stewart, Seattle, Wash.
Electric & Valve Mfg. Co., 64 Murray, New York, N. Y.
Fabrice Thermostatic Control Co., 4750 Sheridan Rd., Chicago, Ill.
Gas-Gard Co., 375 Main St., E., Rochester, N. Y. (Gas.)
General Electric Co., Schenectady, N. Y.
Golden-Anderson Valve Specialty Co., 1385 Fulton Bldg., Pittsburgh, Pa.
Lunkenheimer Co., Cincinnati, O.
Minneapolis-Honeywell Regulator Co., Fourth Ave. & 28th, Minneapolis, Minn.
Michigan Metal Products Co., Battle Creek, Mich.
Nacco Mfg. Co., 1482 Clara Ave., St. Louis, Mo.
Northside Elec. Co., 4227 Spring Grove Ave. Cincinnati, O.
Nu-Way Water Heater Control, Inc., 368 Erie Bldg., Cleveland, O.
Savutime Devices, Inc., 88 Manhattan, Rochester, N. Y.
St. Louis Motor Valve Co., St. Louis, Mo.
Sentinel. See Electric Steam Radiator Co.
Tagliabue Mfg. Co., C. J., 18-83rd St., Brooklyn, N. Y.
Teeple Co., L. R., 540 E. Ninth, Portland, Ore. (Gas.)
Time-O-Stat Controls Co., Elkhart, Ind.
Victor. See Lunkenheimer Co.
Zeco. See Zisch Engineering Corp.
Zisch Engineering Corp., 39 Avenue L, Newark, N. J. (Gas.)

VARNISH. See Paint, Varnish, Lacquer.

VARNISHED TAPE. See Tape, Varnished Fabric.

VARNISHED TUBING. See Tubing, Varnished Fabric.

VOLT BOXES. See Instruments, Laboratory Standard.

VOLTMETERS. See Instruments.

VULCANITE. See Rubber, Hard.

VULCANIZERS, WIRE INSULATION
American Insulating Machinery Co., 519 Huntington Ave., Philadelphia, Pa.
Biggs Boiler Works Co., Akron, Ohio.

WASHERS, FIBRE. See Fibre.

WASHERS, Lock
See also Gaskets, Fiber.
Hobbs Mfg. Co., Worcester, Mass.
Keystone. See Positive Lock Washer Co.
National Lock Washer Co., Newark, N. J.
Positive Lock Washer Co., Ave. A & Miller, Newark, N. J.
Shakeproof Lockwasher Co., 2501 N. Keeler Ave., Chicago.
St. Louis Malleable Casting Co., 7701 N. Conduit Ave., St. Louis, Mo.

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Bridgeport Brass Co., 774 E. Main, Bridgeport, Conn.
Chase Brass & Copper Co., Waterbury, Conn.
Chicago Nut Mfg. Co., 2513 Cullerton, Chicago, Ill.
Hubbard Spring Co., M. D., Pontiac, Mich.
Massachusetts Machine Shop, Inc., Boston, Mass.
New England Screw Co., Dept. A., 44 Farnsworth, Boston.
Quadriga Mfg. Co., 213 W. Grand Ave., Chicago, Ill.
Wrought Washer Mfg. Co., 46 E. Bay, Milwaukee, Wis.

WATTMETERS. See Instruments.

WASHERS, Non-metallic
See also Gaskets, Fibre.
Michigan Leather Washer Co., 548 E. Fort, Detroit, Mich.

WAX AND COMPOUNDS
Wax and Compound, Sealing and Filling.....See W
Junction Box, Potheads, Battery Tops, Bolt Head Holes
Wax and Compound.....See S
Saturating and Finishing, Braided Wire, Impregnating Fabric and Paper.
Chatterton's Compound .....See C
Ackurate Rubber Co., 25 Beaver, New York, N. Y. W . . ..
Ajax. See Sherwin-Williams Co.
Asphalt Products Co., 6531 S. State, Chicago.... S ..
Bishop Wire & Cable Corp., 420 E. 25th, New York, N. Y. C
Biwax Corp., 1017 S. Kolmar Ave., Chicago, Ill. W S ..
Black Nego. See Williams Co., F. M.
Brand & Co., William, 268 Fourth Ave., New York, N. Y. ..... W . . ..
Bulls-Eye. See Zinsser & Co.
Cabilene. See Vacuum Oil Co.
Candy & Co., 35th and Maplewood Ave., Chicago W S ..
Cerowax. See Vacuum Oil Co.
Clifton Mfg. Co., 65 Brookside Ave., Boston.... . . . C
Cochrane Chemical Co., 432 Danforth Ave., Jersey City, N. J. ..... W S ..
Dolph Co., John C., 168 Emmet, Newark, N. J. W . . ..

Di Electric Putty. See Ackurate Rubber Co.
Ever-Protect. See National Cable Compound Co.
Flaks White. See Williams Co., F. M.
General Electric Co., Bridgeport, Conn..... W . . ..
George Co., P. D., St. Louis..... W . . ..
Globe Chemical Co., Murray Road & Big 4 M. R. St. Bernard, Cincinnati, O..... W S ..
Golde Brown. See Williams Co., F. M.
Great Lakes Thread & Yarn Co., Div. of General Cable Corp., 5133 Wesson Ave., Detroit... W . . ..
Hercules Powder Co., 975 Market, Wilmington, Del. (Wood Rosin) ..... S ..
Hexsulate. See Tar Products Corp.
Imco. See Great Lakes Thread & Yarn Co.
India Red Seal. See Williams Co., F. M.
Insulatine Co., 1 Broadway, New York..... W . . ..
Insulation. See Vacuum Oil Co.
Jones & Morse Co., 80 Freeport, Boston, Mass..... W S ..
Laverite. See Mitchell-Rand Mfg. Co.
Lime Seal. See Mitchell-Rand Mfg. Co.
McGill Mfg. Co., Valparaiso, Ind..... . . . C
Mineralac Elec. Co., 1045 Washington Blvd., Chicago, Ill. ..... W . . ..
Mitchell-Rand Mfg. Co., 19 Vesey, New York.... W S C
Mule-Hide. See Lehon Co.
National Cable Compound Co., Mitchell, Ind.... W . . ..
National Wax Co., 189 W. Madison, Chicago, Ill. .. S ..
Nu-Blac. See Star Porcelain Co.
Par Flexo. See Williams Co., F. M.
Rubberseal. See Mitchell-Rand Mfg. Co.
Sub-Flexo. See Williams Co., F. M.
Seidner & Enequist, Inc., 86 Hausman, Brooklyn, N. Y. ..... W . . ..
Sherwin-Williams Co., Cleveland, O..... W . . C
Standard Varnish Wks., 433 4th Av., New York.. W . . ..
Standard Wax & Import Co., 110 E. 42nd, New York, N. Y. ..... W S ..
Star Porcelain Co., Trenton, N. J..... W . . C
Tacrite. See Seidner & Enequist, Inc
Tar Products Corp., Indians Trust Bldg., Providence, R. I. ..... S ..
Trotter & Co., E. T., 576 Johnson Ave., Brooklyn, N. Y. ..... W S ..
Vacuum Oil Co., 61 Broadway, New York, N. Y. W . . ..
Warner-Quinlan Co., 2 Park Ave., New York, N. Y. C
Waverly Oil Wks., 54th and A. V. R. R., Pittsburgh, Pa. ..... S ..
Williams Co., F. M., 1238 Prospect Ave., Brooklyn, N. Y.
Zinsser & Co., 48 Vesey, New York, N. Y..... W . . ..

WEDGE DRIVERS. See Tools, Cummutator.

WELDS, Lamp Lead-in. See Filaments, Incandescent

WELDING AND CUTTING OUTFITS
Electric Arc, Spot, Butt and Seam Metal Welders and Metal Cutting Outfits.
Acme Elec. Welder Co., 1850 W. Fulton, Chicago, Ill.
A. E. F. See American Electric Fusion Corp.
Agnew Electric Welder Co., Milford, Mich.
Allan Mfg. & Welding Co., Inc., 726 Washington, Buffalo.
Almanc. See Allan Mfg. & Welding Co., Inc.
Alternarc. See Electric Arc Cutting & Welding Co.
American Elec. Fusion Corp., 2619 Diversey Ave., Chicago.
Burke Electric Co., Erie, Pa.
Cushing Mfg. Co., 5617 Pacific Blvd., Los Angeles, Cal.
Economy Electric Products Co., 2400 Woodland Ave., Cleveland, O.
Eisler Electric Corp., 756 S. 13th, Newark, N. J.
Electric Arc Cutting & Welding Co., 158 Jelliff Ave., Newark, N. J.
Electric Welding, 744 Court, Brooklyn, N. Y.
Electric Welding Machine Co., 1530 Larned, E., Detroit.
Farwest Electric Welder Co., 1107 Northlake Ave., Seattle.
Federal Machine & Welder Co., Dana Ave., Warren, O.
Fleet-Weld. See Lincoln Elec. Co.
Fusion Welding Corp., 10257 Torrence Ave., Chicago.
General Electric Co., Schenectady, N. Y.
General Engrg. & Supply Co., 160 5th Ave., New York, N. Y.
Hansen. See Northwestern Mfg. Co.
Hollup Corp., C. H., 3333 W. 48th Place, Chicago, Ill.
Lincoln Electric Co., Coit Rd. and Kirby Ave., Cleveland.
Lundy Co., E. A., Fulton Bldg., Pittsburgh, Pa.
Macleod Co., 2232 Bogen, Cincinnati, O.
McAdams Co., J. C., New Britain, Conn.
Nigg Engineering Corp., Second St. & Covina Blvd., Covina, Cal.
Northwestern Mfg. Co., 480 Clinton, Milwaukee, Wis.
Owen Elec. Mfg. Co., Fayetteville, N. C.
Plastic Arc. See Wilson Welder & Metal Co.
Pyrotip. See General Elec. Co.
Quasi-Arc., Inc., 11 W. 42nd St., New York, N. Y.
Rhason Mfg. Co., 217 45th, Union City, N. J.
Rivenson & Son, Jos. T., 2558 W. 16th, Chicago, Ill.
Sellarc Arc Welder Co., 1206 Fourth Ave., Seattle, Wash.
Seneca Electric Welder Corp., 5057 Woodward, Detroit, Mich.
Siemund Wenzel Electric Welding Co., 79 Hancock, Long Island City, N. Y.
Swift Elec. Welder Co., 2567 W. Grand Blvd., Detroit.
Taylor-Winfield Corp., Mahoning Ave., Warren, O.
Thomson-Gibb Electric Welding Co., Lynn, Mass.
Toledo. See Thomson-Gibb Elec. Welding Co.
Una Welding & Bonding Co., 1615 Collamer Ave., Cleveland, O.
U. S. L. Battery Corp. Niagara Falls, N. Y.
Weldite. See Fusion Welding Corp.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
Wilson Welder & Metal Co., Hoboken factory, Terminal Bldg., Hoboken, N. J.
Zeus. See Thomson-Gibb Elec. Welding Co.

WHEATSTONE BRIDGES. See Instruments, Laboratory Standard.

WICKS, Lubricating
Brawley Felt Co., Inc., T. R., 279 20th, Brooklyn, N. Y.

WINDERS
Armature & Field Coil. See Winding Machines, Armature & Field Coil.
Coil. See Winding Machines, Armature & Field Coil.
Electromagnet. See Winding Machines, Induction Coil.
Filament. See Machines, Lamp Making.
Induction Coil. See Winding Machines, Induction Coil.
Loop. See Winding Machines, Armature & Field Coil.

WINDING MACHINES, Armature and Field Coil
Acme Electric & Mfg. Co., 1439 Hamilton Ave., Cleveland, Ohio.
Armature Coil Equipment Co., 2415 Forestdale Ave., Cleveland, Ohio.
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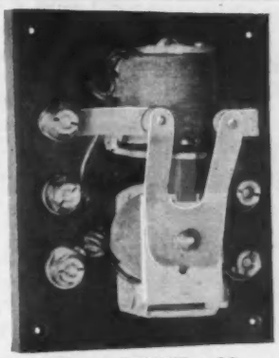

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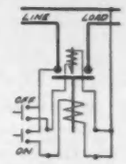

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Comstock Mfg. Co., Wilkes-Barre, Pa.
Conran, Frederick M., 107 Colden, Newark, N. J.
Electric Service Supplies Co., 17th & Cambria Sts., Philadelphia, Pa.
Handy. See Armature Coil Equipment Co., 2415 Forestdale Ave., Cleveland, Ohio.
Herald Electric Co., 29 East End Ave., New York, N. Y
Hunsdorf, Wm., 2056 E. Fourth, Cleveland, O.
Liberty Starter Co., 271 Vinewood Ave., Detroit, Mich.
Line, W. C., 208 S. Geddes, Syracuse, N. Y.
Mutual Foundry & Machine Co., Atlanta, Ga.
Onan, David W., 43 Royalstone Ave., Minneapolis, Minn.
Peerless. See Electric Service Supplies Co.
Ridlon Co., Frank, 253 A St., Boston, Mass.
Sagur. See Electric Service Supplies Co.
Seifert, E. R., 315 E. Washington, Syracuse, N. Y.
Superior. See Armature Coil Equipment Co.

WINDING MACHINES, Induction Coil

Acme Elec. & Mfg. Co., 1439 Hamilton Ave., Cleveland, O.
Belden Mfg. Co., 4633 W. Van Buren, Chicago, Ill.
Conran, Frederick M., 107 Colden, Newark, N. J.
Eureka Tool & Machine Co., 42 Walnut, Newark, N. J.
Leesona. See Universal Winding Co.
Line, W. C., 208 S. Geddes, Syracuse, N. Y.
Morris Register Co., 29th & Broadway, Council Bluffs, Iowa.
Radio Production Machinery Co., 212 Centre, New York.
Seifert, E. R., 315 E. Washington, Syracuse, N. Y.
Universal Winding Co., Boston, Mass.
Viking Tool & Machine Co., 747 65th, Brooklyn, N. Y.
Weehawken Engineering Co., 543 Gregory Ave., Weehawken, N. J.

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Forms. See Forms, Wire.
Frames. See Forms, Wire.
Fuse. See Fuses and Fuse Wire.
Lamp & Tube Filament. See Filaments, Incandescent Lamp.
Magnet. See Wire, Insulated.
Molybdenum. See Molybdenum.
Phosphor Bronze. See Phosphor Bronze.
Platinum. See Platinum.
Radio Bus. See Wire, Bare.
Scrapers. See Strippers.
Strippers. See Strippers.
Tungsten. See Filament, Incandescent Lamp.

WIRE, Bare

Armature Banding	See S
Copper Wire	See C
Iron Wire	See S
Phosphor Bronze	See B
Radio Bus Wire	See C
Resistance Wire	See R
Steel Wire	See S

Acme. See Alloy Metal Wire Co.
Alpha Wire Corp., 520 Broadway, New York.. C R ..
Advance. See Driver Harris Wire Co.
Alloy Metal Wire Co., Moore, Pa..... C R ..
American Copper Products Corp., 233 Broadway, New York, N. Y. ..... C R ..
American Electrical Works (Phillipsdale), Providence, R. I. ..... C ...
American Insulated Wire & Cable Co. Div. of General Cable Corp., 954 W. 21st, Chicago.... C .. S
American Steel & Wire Co., 208 S. La Salle, ... C ...
Anaconda Wire & Cable Co., 25 Broadway, New York, N. Y. ..... C ...
Anylite Elec. Co., Fort Wayne, Ind..... C ...
Ballast. See Gilby Wire Co.
Baltimore Copper Mills, Div. of Revere Copper & Brass, Inc., Baltimore, Md. ..... C ...
Bassett Metal Goods Co., Derby, Conn. (General Sales Agent, Hatheway & Co., 16 Hudson, New York, N. Y ..... C ..
Belden Mfg. Co., 4633 W. Van Buren, Chicago... C .. S
Beldenite. See Belden Mfg. Co.
Bradford, Kyle & Co., Plymouth, Mass..... B ..
Braidite. See Cornish Wire Co.
Bronvar. See American Insulated Wire & Cable Co.
Bridgeport Brass Co., Bridgeport, Conn..... C ...
Calido. See Driver Harris Wire Co.
Chromel. See Hoskins Mfg. Co.
Chromic. See Murray-Harris Wire Co.
Climax. See Driver Harris Wire Co.
Comet. See Driver Harris Wire Co.
Cook Plate Co., Rdv. N., 70 Ship, Providence, R. I. C ...
Copel. See Hoskins Mfg. Co.
Copperweld Steel Co., Glassport, Pa..... C .. S
Cornish Wire Co., 30 Church, New York, N. Y.. C ...
Curwica. See Cornish Wire Co.
Crapo. See Indiana Steel & Wire Co.
Crescent Ins. Wire & Cable Co., Trenton, N. J.. C ...
Cromin. See Gilby Wire Co.
Cuprum. See Gilby Wire Co.
Darow Mfg. Co., 36 E. 20th, New York, N. Y... C ...
Detroit Insulated Wire Co., Detroit, Mich.... C
1885. See Chicago Insulated Wire & Mfg. Co
Driver-Harris Wire Co., Harrison, N. J..... R ..
Electron. See Bassett Metal Goods Co.
Excellicor. See Branford Elec. Co.
Fullman Mfg. Co., 1209 Jefferson, Latrobe, Pa... ..
Gilby Wire Co., Riverside Ave., Newark, N. J... B ..
Goldmark Co., James, 83 Warren, New York.. C ...
Hope Webbing Co. 1005 Main, Pawtucket, R. I. (Braided Wire Tape) ..... C ...
Hoskins Mfg. Co., 4435 Lawton Ave., Detroit, Mich. ..... R ..
Hudson Wire Co., Ossining, N. Y..... C R ..
Ideal. See Driver Harris Wire Co.

Indiana Rubber & Insulated Wire Co., Jonesboro, Ind. ..... C .. S
Indiana Steel & Wire Co., Muncie, Ind. .... S
Karma. See Driver Harris Wire Co.
Keystone. See Fullman Mfg. Co.
Lucero. See Driver Harris Wire Co.
Marion Insulated Wire & Rubber Co., Marion, Ind. C ....
Monax. See Standard Alloy Wire Co.
National-Harris Wire Co., 195 Verona Ave., Newark, N. J. ..... R ..
Nehring Electrical Works, De Kalb, Ill. ..... C ....
Nichrome. See Driver Harris Wire Co.
Novar. See Standard Alloy Wire Co.
Page Steel & Wire Co., Bridgeport, Conn..... .. S
Paranite. See Indiana Rubber & Insulated Wire Co.
Peerless. See Alloy Metal Wire Co.
Phillips Wire Co., Div. of General Cable Corp., Pawtucket, R. I. ..... C ....
Phono-Electric. See Bridgeport Brass Co.
Premier. See Alloy Metal Wire Co.
Providence Insulated Wire Co., Providence, R. I.. C ....
Race. See Rome Wire Co.
Revolute Wire Co., Hastings-on-Hudson, N. Y.... C ....
Rico Co., A. H., Pittsfield, Mass. ..... C ....
Roebling's Sons Co., John A., Trenton, N. J..... C .. S
Rome Wire Co., Div. of General Cable Co., Rome, N. Y. ..... C ....
Ross Wire Co., 69 Bath, Providence, R. I..... C ....
Seneca Wire & Mfg. Co., Fostoria, O. .... S
Silicrimp. See Valley Narrow Fabric Co.
Silectron. See Standard Alloy Wire Co.
Solar. See Gilby Wire Co.
Spargo Wire Co., J. A., Rome N. Y..... C ....
Standard Alloy Wire Co., Elizabeth, N. J. .... S
Standard Underground Cable Co. (Div. of General Cable Corp.), Pittsburgh, Pa. ..... C ....
Super-Insulated Wire Co., Plymouth, Mass. ..... C ....
Superior. See Alloy Metal Wire Co.
Talking Tape. See Hope Webbing Co.
Therlo. See Driver-Harris Wire Co.
Tophet. See Gilby Wire Co.
Tru-Lay. See Page Steel & Wire Co.
Valley Narrow Fabric Co., Falls, R. I.
Wheeler Insulated Wire Co., Bridgeport, Conn .. C ....

WIRE CLOTH. See Cloth, Wire.

WIRE, Copper Clad

Copperweld Steel Co., Glassport, Pa.
Standard Underground Cable Co., Div. of General Cable Corp., Pittsburgh, Pa.

WIRE SOLDER. See Solder, Bar and Wire.

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Torrington Manufacturing Co., 70 Franklin, Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, Ohio.
Wire Machinery Corp. of Am., New Haven, Conn.

WIRE FORMING MACHINE

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WIRE, Insulated

KEY

Annunciator, Office, Bell Wire	See A
Asbestos Covered Heater Cord	See H
Asbestos Covered Magnet Wire	See M
Enameled Magnet Wire	See M
Fixture Wire	See B
Flexible Reinforced Heavy Duty Cord	See F
Heater Cord	See H
Ignition Cable	See B
Lamp Cord	See B
Magnet Wire	See M
Rubber Covered Wire & Cable	See R
Stove Wire	See H
Telephone Cord	See T

A-A Wire Co. (Div. of General Cable Corp), 420 Lexington Ave., N. Y. C.. R .. ..
A-1 Brand. See American Insulated.
Acme Wire Co., New Haven, Conn.
Enamaled Silk, Cotton .... M
Amelectric. See American Elec.
American Braiding Co., Holyoke, Mass. R .. ..
American Brand. See American Insulated Wire & Cable Co.
American Copper Products Corp., 233 Broadway, New York, N. Y. ....
American Electrical Works (Philipsdale), Providence, R. I. .... M
American Enameled Magnet Wire Co., Muskegon, Mich. .... M
American Insulated Wire & Cable Co. Div. of General Cable Co., 954 W. 21st. Chicago, Ill .... M
American Insulated Wire Corp., 45 Baker, Providence, R. I. ..... R F .. A T ..
American Steel & Wire Co., 208 S. La Salle, Chicago, Ill. ..... R F H A T M
Americore. See American Steel.
Amerite. See American Steel.
Amerixe. See American Steel.
Amparak. See American Steel.
Anaconda Wire & Cable Co., 25 Broadway, New York, N. Y. ..... R F .. A .. M
Anaconda Wire & Cable Co., Maring Wire Branch, Muskegon, Mich. (Silk, Enamel) .. .. M
Ansonia Electrical Co., Ansonia, Conn. Silk, Cotton, Enameled .... A .. M
Armoriokt. See American Steel.
Bay State Insulated Wire & Cable Co., Paydras (Mariapan) 28 Boston..... R .. ..
Belden Mfg. Co., 4633 W. Van Buren Chicago, Ill. ..... R F H A T M
Beldenamel. See Belden Mfg. Co.
Beldenite. See Belden Mfg. Co.
Bishop Wire & Cable Corp., 420 E. 25th, New York, N. Y. ..... R F .. ..
Boston Insulated Wire & Cable Co., 65 Bay, Boston, Mass. ..... R F H .. .. M
Bradford, Kyle & Co., Plymouth, Mass. .. .. M
Cablex. See Collyer Insulated Wire Co.
Celatsite. See Acme Wire Co.
Collyer Insulated Wire Co., Pawtucket.. R F H .. .. ..
Colorbeston. See General Elec. Co.
Colorubber. See Belden Mfg. Co.
Condex. See Simplex Wire Co.
Copperweld Steel Co., Rankin, Pa..... R .. .. .. T ..
Cotenamel. See Belden Mfg. Co.
Cottonite. See Acme Wire Co.
Crescent Braid, Inc., Providence, R. I..... H .. ..
Crescent Ins. Wire & Cable Co., Trenton R F H A T M
Darow Mfg. Co., 36 E. 20th, New York. R .. ..
Davis-Jones Insulated Wire Co., Pawtucket, R. I. ..... R F H A T ..
Deltabeston. See York Insulated.
Detroit Insulated Wire Co., Detroit, Mich. R .. .. .. T ..
Diamond Braiding Mills, Chicago Heights R F H .. .. M
Di-Noburn. See Diamond Braiding Mill.

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Dreadnaught. See Indiana Rubber Co.
Driver-Harris Co., Harrison, N. J..... R .. ..
Dudlo Mfg. Co., Div. of General Cable Corp., Fort Wayne, Ind.. .. .. M
Ducatto. See Dudlo Mfg. Co.
Durablit. See Anaconda Wire & Cable Co.
Duracord. See Anaconda Wire & Cable Co.
Durawire. See Anaconda Wire & Cable Co.
Duro. See McEvoy, C. H.
Eagle. See Goldmark Co., James.
Eastern Insulated Wire Co., Tilton, N. H. R .. ..
1885. See Chicago Insulated Wire.
Enamelite. See Acme Wire Co.
Enterite. See Rome Wire Co.
Fibrex. See Simplex Wire Co.
Flexible Woven Cable Co., 755 Boylston, Boston, Mass. ..... F .. ..
Flex-O-Cord. See Packard Elec. Co.
Garco. See General Asbestos Co.
Gavitt Mfg. Co., West Brookfield, Mass. .. .. T ..
GE-Flex. See General Elec. Co.
General Asbestos & Rubber Co., Charleston, S. C. ..... H .. ..
General Elec. Co., Merchandise Dept., WR323 Bridgeport, Conn ..... R F H .. .. M
Giant See Gilby Insulated Wire
Gilby Wire Co., Riverside Ave., Newark, N. J. ..... H .. ..
Globe Insulated Wire, 148 Old Colony Ave., Wollaston, Mass. ..... R .. ..
Goldmark Co., James, 83 Warren, New York, Annunciator and Asbestos, Cotton, Silk and Enameled Magnet ..... A .. M
Goodyear Rubber Insulating. See Graybar Electric Co.
Graybar Elec. Co., Graybar Bldg., Lexington Ave. & 43rd St., New York, N. Y. R .. .. .. T ..
Grimshaw. See New York Ins.
Hatex. See Hatfield Rubber Wks.
Hatfield Rubber Wks., Inc., Hillside, N. J. ..... R F H .. T ..
Hazacord. See Hazard Insulated Wire Works.
Hazard Insulated Wire Works, Div. of Okonite Co., Wilkes-Barre, Pa.... R F .. A .. ..
Holyoke Co., 821 Broadway, New York.. R .... A .. M
Inca Mfg. Co., Fort Wayne, Ind. .. .. M
Indiana Rubber & Insulated Wire Co., Jonesboro, Ind. ..... R F H .. .. ..
I. X. L. See Collyer Insulated.
Kable. See Safety Cable Co.
Kenrite. See American Insulated.
Kerite Ins. Wire Cable Co., 30 Church, New York, N. Y. ..... R .. .. T M
Kilo, Co., 2 E. 23d, New York..... .. .. .. T M
Koelle, Frederick C., Real Estate Trust Bldg., Philadelphia, Pa. .... T ..
Lowell Insulated Wire Co., Lowell, Mass. R F H .. .. ..
Liberty. See Nat. Metal Molding
Loxsteel. See Hazard Insulated Wire Works.
McEvoy, C. H., Lowell, Mass..... R .. .. .. T ..
Marion Insulated Wire & Rubber Co., Marion, Ind. ..... R F H A T ..
Massachusetts Elec. Mfg. Co., West Lynn, Mass. .... M
Montgomery Co., J. R., Windsor Locks, Conn. .... T
National Elec. Products Corp., Pittsburgh. R F H A T M
National-Harris Wire Co., 195 Verona Ave., Newark, N. J. ..... R .. ..
New England Elec. Wks., Lisbon, N. H.. R .. ..
N. E. See New England Elec. Wks.
New York Insulated Wire Co., 114 Liberty, New York, N. Y. ..... R .. ..
Nitro. See Belden Mfg. Co.
O. K. See Phillips Wire Co. Also Okocord. See Okonite Co.
Okonite Co., Passaic, N. J. ..... R .. ..
Ozex. See Simplex Insulated Wire
Packard Electric Co., Warren, O..... R F .. ..
Parac. See Phillips Wire Co.
Paracore. See U. S. Rubber Co.
Paraflex. See Bishop Wire & Cable.
Paranite. See Indiana Rubber.
Parkerite. See Seward Wire Co.
Peco. See Packard Elec. Co.
Philadelphia Insulated Wire Co., 100 N. Third, Philadelphia, Pa. .... H A T ..
Phillips Wire Co., Div. of General Cable Corp., Pawtucket, R. I. ..... R .. ..
Providence Insulated Wire Co., Providence R F H A .. ..
Raven Core. See New York.
Reliance. See American Steel.
Revolute Wire Co., Hastings-on-Hudson, N. Y. .... M
Rockbestos Products Corp., 369 Nicoll, New Haven, Conn. ..... R .. H .. T M
Roebling's Sons Co., John A., Trenton, N. J. ..... R F H A T M
Rome Electrical Co., Inc., Div. of General Cable Corp, Rome, N. Y. .... M
Rome Wire Co., Div. of General Cable Corp., Rome, N. Y. ..... R F H .. T M
Ross Wire Co., 69 Bath, Providence, R. I.. R .. ..
Romoxide. See Rome Wire Co.
Ruffcoat. See Rome Wire Co.
Runsel-Lenz Elec. Mfg. Co., 1751 N. Western Ave., Chicago, Ill. .... T ..
Safety Cable Co. (Div. of General Cable Corp.), New York ..... R F H .. .. ..
Salamander. See York Insulated.
Seward Wire Co., Parkersburg, W. Va. R .. ..
Silkenamel. See Belden Mfg. Co.
Silkenite. See Acme Wire Co.
Simcore. See Simplex Wire.
Shield. See Ansonia Elec'l Co.
Simplex Wire & Cable Co., 201 Devonshire, Boston, Mass. ..... R F H .. T ..
Southern States Cable Co., Div. of General Cable Corp., Mobile, Ala..... .. .. M

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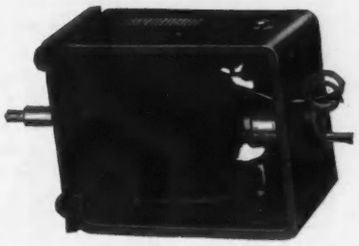

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Standard Alloy Wire Co., Elizabeth, N. J. . . . . H . . . . .
Standard Underground Cable Co., Pittsburgh, Pa. (Div. of General Cable.) B F H A T . .
Sterling. See Standard Underground.
Sterling Insulated Wire Co., Fall River, Mass. . . . . B . . . . . .
Strand & Sweet Mfg. Co., Winsted, Conn. . . . . M
Super-Service. See Rome Wire Co.
Sweetstrand. See Strand & Sweet.
Tip-Top. See Standard Underground.
Tirex. See Simplex Wire & Cable.
Trenchlay. See Rome Wire Co.
Triangle Conduit Co., Dry Harbor Rd. & Cooper Ave., Brooklyn. . . . . B . . . . . .
Tubular Woven Fabric Co., Pawtucket, R. I. . . . . B F . . . . . .
United States Rubber Co., 1790 Broadway, New York, N. Y. . . . . B . . H A T .
U. S. Royal. See United States.
Varflex Corp., Rome, N. Y. . . . . M
Warrior. See American Copper.
Wheeler Insulated Wire Co., Bridgeport, Conn. . . . . B F H A T M
White, J. M., 1128 Oliver, Philadelphia, Pa. . . . . B F H . . T . .
Whitney Blake Co. See Graybar Electric Co.
Wovenite. See Flexible Woven.
York Insulated Wire Wks. of G. E. Co., 129 Broadway, New York, N. Y. . . . . B . . H . . . M

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(See Also Wire Drawing Machines; Insulation Mixers; Taping Machines, Wire; Wire Polishing Machines; Enameling Machines for Magnet Wire; Wire Wrapping Machines; Vulcanizers, Wire Insulation.)

Armoring Machines . . . . . See A
Braiding Machines . . . . . See B
Bunching Machines . . . . . See S
Covering Machines . . . . . See I
Insulating Machines . . . . . See I
Insulation Straining Machines . . . . . See I
Measuring Machines . . . . . See M
Park Cabling Machines . . . . . See A
Saturating Tanks . . . . . See F
Spooling Machines . . . . . See U
Stranding Machines . . . . . See S
Tinning Tanks . . . . . See F
Winding Reels . . . . . See U

Adamson Machine Co., Akron, Ohio. . I A . . . . . .
Aimes-Seward. See American Insulating Machinery Co.
American Insulating Machinery Co., 519 Huntington Ave., Philadelphia, Pa. I A . . . . S T F

Breguet. See American Insulating
Crescent. See Royle & Sons, John.
Durant Mfg. Co., 662 Buffum, Milwaukee, Wis. . . . . M . . U . .
Fidelity Machine Co., 3908 Frankford Ave., Philadelphia, Pa. . . . . B . . . . . .
Housatonic Machine & Tool Co., Bridgeport, Conn. . . . . I . . . . . U . .
Minneapolis Elec. & Construction Co., 80 S. 12th St., Minneapolis, Minn. . . . . M . . U . .
Nebutteo. See New England Butt Co.
New England Butt Co., 324 Pearl, Providence, R. I. . . . . I A B M S U . .
Peerless. See Royle & Sons, John.
Royle & Sons, John, Paterson, N. J. I . . . . . .
Sleeper & Hartley, Inc., Worcester, Mass. . . . . A . . . S U
Terkelsen Machine Co., Terkelson Bldg., Boston, Mass. . . . . M . . . . .
Textile Machine Works, Reading, Pa. . . . B . . . .
Universal Wire Machy. Co., 69 Daggett, New Haven, Conn. . . . . A . . . . . U F
Utility Mfg. Co., Cudahy, Wis. . . . . I . . . . . .
Wardwell Braiding Machine Co., Central Falls, R. I. . . . . B . . . . . .
Watson Machine Co., 74 Railroad Ave., Paterson, N. J. . . . . I . . . . . .
Wire Machinery Corp. of Am., New Haven, Conn. . . . . M S U . .
Weir. See Housatonic Machine

WIRE POLISHING MACHINES

(See Also Wire Manufacturing Machines).
American Insulating Machinery Co., 519 Huntington Ave., Philadelphia, Pa.
New England Butt Co., 324 Pearl, Providence, R. I.

WIRE, Steel Flat

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American Steel & Wire Co., 208 S. La Salle, Chicago, Ill.
Crescent Insulated Wire & Cable Co., 319 N. Oden Ave. Trenton, N. J.
Roebling's Sons Co., John A., Trenton, N. J.
Seneca Wire & Mfg. Co., Fostoria, O.

WIRE STRAIGHTENING MACHINES

Franklin Mfg. Co., New Haven, Conn.
Kane & Roach, Syracuse, N. Y.
Shuster Co., F. B., New Haven, Conn.
Seifert, E. R., 315 E. Washington, Syracuse, N. Y.

WIRE TAPING MACHINES. See Taping Machines, Wire.

WIRE VULCANIZING MACHINES. See Vulcanizers.

WIRE WRAPPING MACHINES

Terkelsen Machine Co., Terkelsen Bldg., Boston, Mass.

WOOD BLOCKS. See Cabinets & Boxes, Wood.
Boxes. See Cabinets & Boxes, Wood
Cabinets. See Cabinets & Boxes, Wood
Pulleys. See Pulleys, Composition.
Woods Metal. See Radio Mountings.

WRAPPERS, Paper. See Boxes and Wrappers.

WRAPPERS, Tungsten Lamp. See Boxes and Wrappers.

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Ambler Asbestos Shingle & Sheathing Co., Ambler, Pa.
American Asbestos Co., Norristown, Pa.
American Glanzstopf Corp., 180 Madison Ave., New York.
Anchor Thread Co., Trenton (Groveville), N. J.
Asbestos Fibre Spinning Co., North Wales, Pa.
Columbian Rope Co., Auburn, N. Y.
Commercial Rayon & Thread Co., 19 W. 21st, New York.
Fawcett, Inc., Hughes, 115 Franklin, New York, N. Y.
Ferodo & Asbestos, Inc., New Brunswick, N. J.
Florsheim, H. A., 225 Fifth Ave., New York, N. Y.
Franklin Rayon Corp., 86 Crary, Providence, R. I.
General Electric Co., Schenectady, N. Y.
Great Lakes Yarn & Thread Co., Div. of General Cable Corp., 5133 Wesson Ave., Detroit, Mich.
Johns-Manville Corp., New York, N. Y. (Asbestos.)
Kubar Mfg. Co., Davidson, N. C.
Lees Mfg. Co., 320 Broadway, New York, N. Y.
Multiple Winding Co., 77 Summer, Boston, Mass.
Rich & Co., H. S., 180 S. Water, Providence, R. I.
Ryle & Co., Wm., 381 Fourth Ave., New York, N. Y.
Silkslip. See Worcester Bleach & Dye Wks. Co.
Smith & Dove Mfg. Co., Andover, Mass. (Linen Thread.)
Worcester Bleach & Dye Wks., Worcester, Mass.

ZINC

Bunker Hill. See St. Joseph Lead Co.
Horse Head. See New Jersey Zinc Co.
New Jersey Zinc Co., 160 Front, New York, N. Y.
Platt Bros. & Co., Waterbury, Conn. (Strips.)
St. Joseph Lead Co., 250 Park Ave., New York, N. Y.
United Metals Selling Co., 25 Broadway, New York, N. Y.

ZINCS AND COPPERS, Battery

Bunker Hill. See St. Joseph Lead Co.
Bunnell & Co., J. H., 32 Park Pl., New York, N. Y.
Edes Mfg. Co., Plymouth, Mass.
Extruded Metal Corp., 184 53rd, Brooklyn, N.Y. (Zinc Cups.)
Franklin. See Grasselli Chemical Co.
Grasselli Chemical Co., Guardian Bldg., Cleveland, O.
Illinois Zinc Co., Peru, Ill.
Lind Mfg. Co 70 Wyckoff Ave., Brooklyn, N.Y. (Zinc Cups.)
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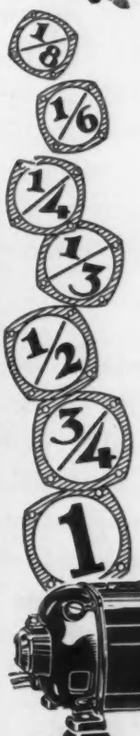

They say that the wings of a tiny humming bird spin faster than the propeller of an airplane. Amazing. Wonder where all that power comes from.

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Leland
fractional
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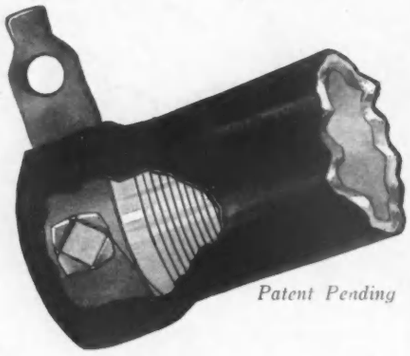

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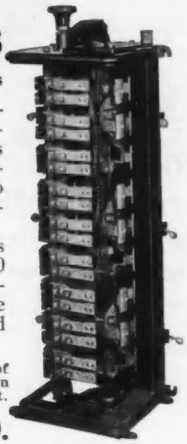

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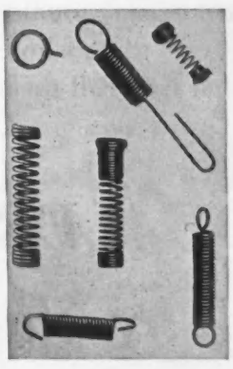

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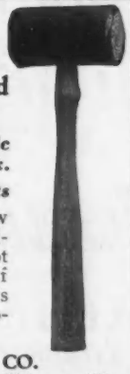

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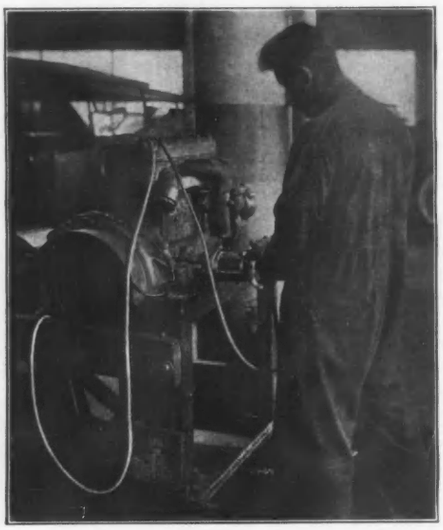

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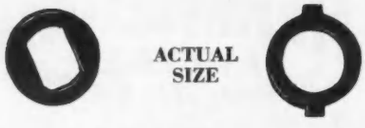

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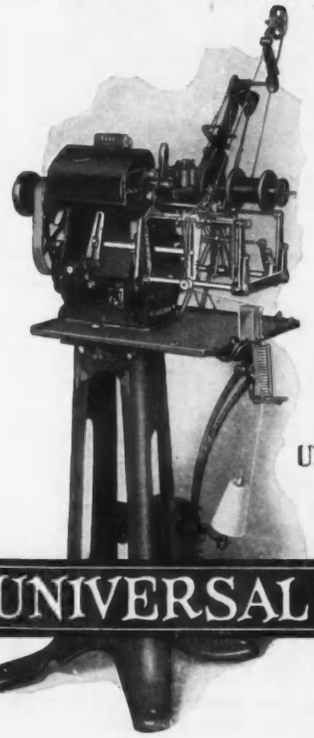

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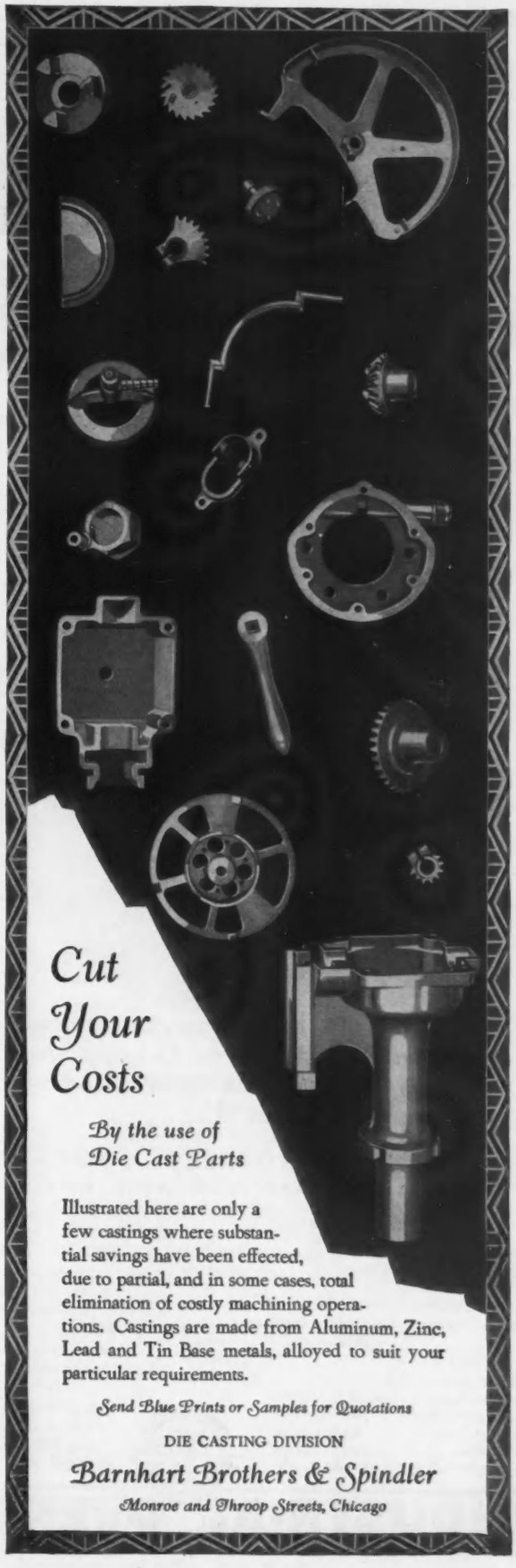

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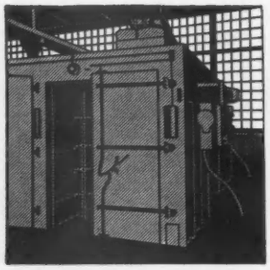

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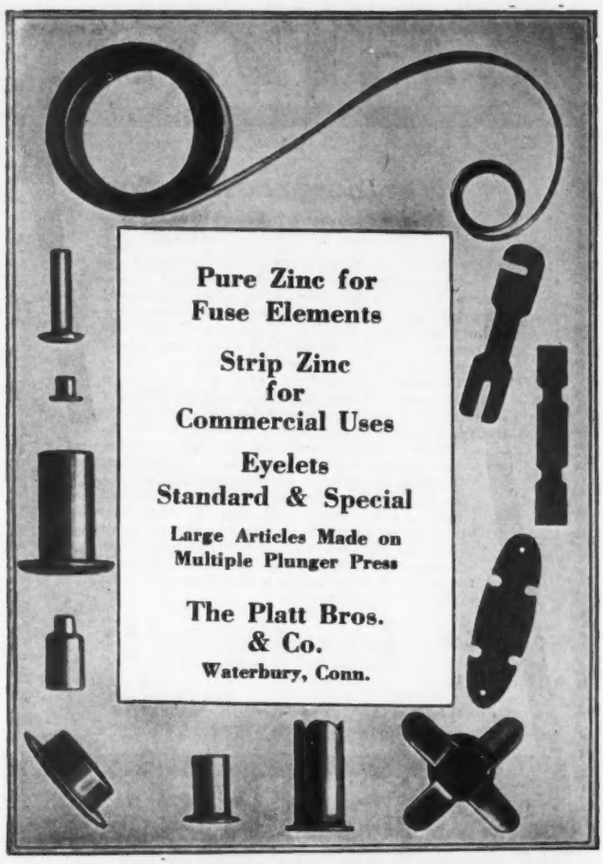

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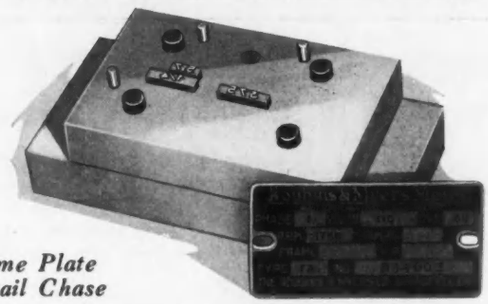

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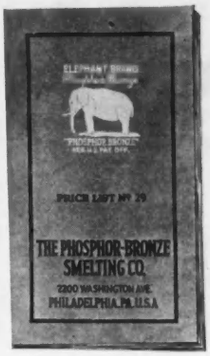

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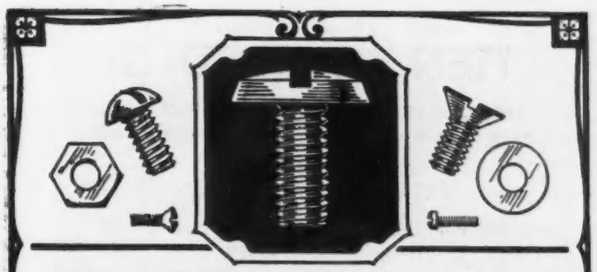

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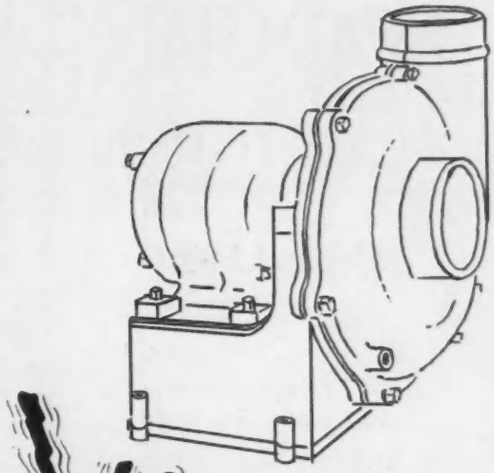

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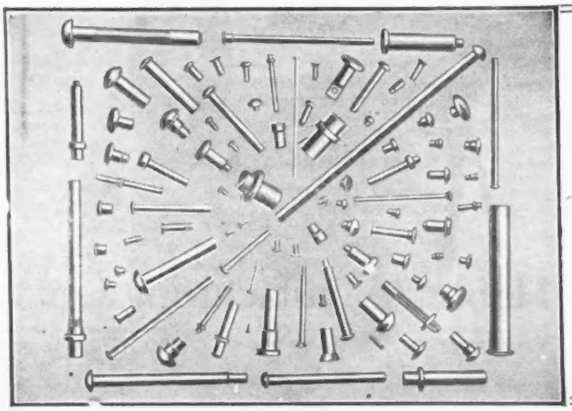

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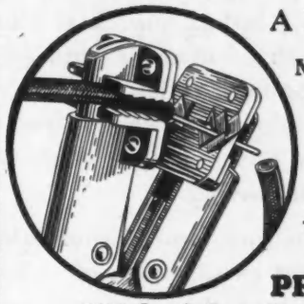

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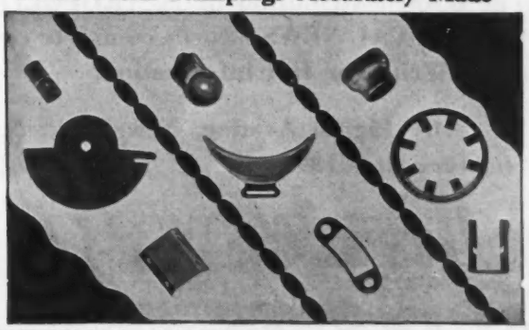

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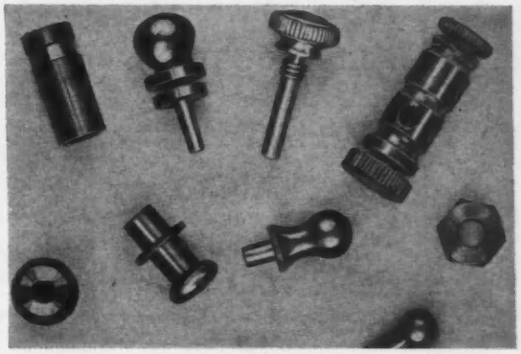

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Boonton, New Jersey

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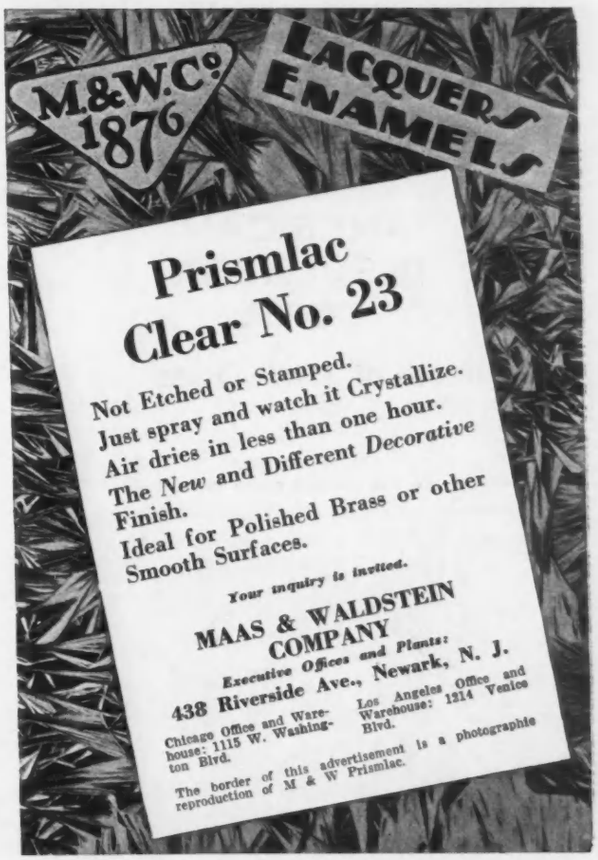
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SELF-TAPPING SCREWS 1 operation	MACHINE SCREWS 5 operations
	1 Making tap plates
	2 Welding tap plates fast to metal
	3 Tapping holes
	4 Retapping after painting
Just turn in the Screw Taps its own thread	5 Turning in Machine Screws

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Dept. K, 190-204 Varick St., New York, N. Y.

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Sheet Metal Screws

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